Information Technology
List of Attachments

IT - A	City Manager's Monthly Executive Report (Question 1d)
IT - B	Phoenix Education and Youth System Map Products (Question 2)
IT - C	Phoenix Education and Youth System Steering Committee Presentation (Question 2)
IT - D	Phoenix Maps On-line Users Manual (Question 2)
IT - E	Land Information System (LIS) Business Systems Descriptions (Question 2)
IT - F	Employee Development and Training Catalog (Question 2)
IT - G	Information Technology Policies, Standards, and Guidelines (Question 4a)
IT - H	10-Year Architecture Vision (Question 4a)
IT - I	Information Superhighway Policy (Question 4a)
IT - J	Electronic Community Access Model (ECAM) Policy (Question 4a)
IT - K	Phoenix Organization Chart (Question 4c)
IT - L	Information Technology Director Job Specification (Question 4d)
IT - M	Information Technology Department's Information Technology Plan (Question 5a)
IT - N	Engineering & Architectural Services Department's Information Technology Plan (Question 5a)
IT - O	Enterprise Engineering Methodology (Question 5a)
IT - P	Business Planning Guideline (Question 5a)
IT - Q	Information Technology Department's Operational (Strategic) Plan and PhxWeb Listserv (Tactical) Plan (Question 6a)
IT - R	Intranet Task Force Report (Question 6a)
IT - S	City Auditor Telecommuting Findings (Question 6a)
IT - T	Cost Comparison (Question 6a)
IT - U	Phoenix At Your Fingertips Project Evaluation Report (Question 6b)
IT - V	Qualified Vendor List (QVL) (Question 7b)
IT - W	Qualified Vendor List (QVL) Request for Qualifications (Question 7b)
IT - X	Project Charter (Question 8a)
IT - Y	PhoenixNet Study (Question 8b)
IT - Z	SAP Comprehensive Program Budget Review (CPBR) (Question 8b)
IT - AA	Data Sharing Agreement (Question 9)
IT - AB	Information Technology Department's Training Plan (Question 6b)
IT - AC	Year 2000 Status Review Final Report (Question 13)
IT - AD	Year 2000 Status by Department (Question 13)
IT - AE	Year 2000 Milestones (Question 13)
IT - AF	Geographic Information Systems Applications Summary (Question 14)
IT - AG	Geographic Information Systems Enterprise-wide Data Layers (Question 14)
IT - AH	Current Uses of Geographic Information Systems by Department (Question 14)
IT - AI	Geographic Information Systems Overview Diagram (Question 14)
IT - AJ	Geographic Information Systems Mapping Workload Statistics (Question 14)
IT - AK	Geographic Information Systems Quarterly Newsletter (Question 14)
IT - AL	Geographic Information Systems Program Presentation (Question 14)

Provided for Additional Reference:

- Independent Auditor's Management Letter
- PhxWeb media and publicity material
- Geographic Information Systems (GIS) media and publicity material

Please answer the following questions about Information Technology in Phoenix.

1. **Please explain how well Phoenix's information technology systems support financial management, human resources management, capital management, and managing for results in Phoenix government. In particular, please describe and provide examples of the ways in which Phoenix's current information technology system serves as a tool to help accomplish the following:**

    a. Financial management (including budgeting, financial reporting, accounting and cost accounting, fraud control, procurement, and contract monitoring).

    Phoenix has a fully-integrated financial management system, SAP R/3, which was implemented in July, 1998. SAP is highly regarded by the business community as a "best practices" system. In fact, at the time Phoenix purchased SAP, *Fortune* magazine indicated that six of the top 10 Fortune 500 companies used SAP. Phoenix was the first major city to implement SAP and was instrumental in assisting SAP in refining its Funds Management module to allow true governmental funds accounting.

    Phoenix's implementation of SAP included the Accounts Payable, Accounts Receivable, Purchasing, Fixed Asset Management, Inventory Management, Cost Accounting, Funds Management, and Capital Improvement Project Management modules. Each module of SAP is integrated with the others to allow on-line, real-time information to end-users. Separate departmental financial management systems are no longer required because needs are met exclusively through SAP. The use of this newer client/server technology has placed the power of SAP in the hands of more than 1,300 Phoenix employees.

    Phoenix's production SAP system is currently supported by a single Informix database in excess of 80 gigabytes in size. This database is presently comprised of 12,980 tables. An average of 850,000 on-line transactions is being performed each week, generating over 165 million database updates. Batch processing adds an additional 30 million database updates weekly. Phoenix's pre-implementation system sizing and transaction volume estimates were accurate and comprehensive enough that, after a full year of database growth, on-line financial transactions average only 1.1 seconds total response time at the end-user workstation across a metropolitan area network. This average includes end-user queries that generate report information. On-line transactions that only update or view the database average less than 800 milliseconds per transaction.

    The following are examples of how SAP manages Phoenix's financial assets:

    - <u>Cost Accounting</u> - SAP's cost accounting module supports all types of cost accounting needs, including activity-based costing. The cost accounting module is updated in real-time from financial transactions. To meet existing cost accounting needs, Phoenix implemented the following SAP cost accounting functionality: activity charges, internal orders, cost center accounting, profit center accounting, assessments, surcharges, and distributions.

        Cost accounting information is used in many decision-making processes and to support cost-based user fee charges to the public, such as water fees, solid waste collection and disposal fees, and airport landing fees. Often, cost accounting is analyzed at a low level, such as the cost to turn off a water connection or play at a ball field.

        The costs used in the user fee analysis include an allocation of central service (staff and administrative) charges, such as payroll, financial accounting, and purchasing. These costs are calculated and allocated in SAP using more than 20 different allocation bases, ranging from number of financial transactions to budgeted costs. The allocations are made to more than 3,000 cost centers.

        Phoenix uses cost accounting information when it competes with the private sector. Incremental cost analysis is used to determine who should provide services to the public (such as refuse collection or ambulance service). In fact, Phoenix used this information when it was one of the bidders in two major refuse collection service bid competitions that took place last year.

Cost analysis is also important for Federal grant cost recovery. In these cases, the Federal Government often dictates special requirements.

Phoenix also uses cost accounting for departmental decision-making (e.g., "How much does it cost Phoenix to perform a certain activity and should this activity be discontinued?"). SAP is used in this type analysis.

- General Accounting - SAP integrates all aspects of financial accounting. All payable, receivable, asset and fund management processes are located in one system.

  Payable transactions are processed on-line by department users, which eliminates the need for central review and data entry of documents. The electronic payable document proceeds through a predetermined electronic authorization workflow path depending on the type, origin, and dollar amount before being released for warrant processing.

- Financial Reporting - SAP users can create on-line queries to obtain real-time financial information as needed. The data can also be downloaded in spreadsheet or database format for further analysis or presentation. SAP provides Phoenix staff with great flexibility in generating reports.

  SAP receives data from both the budget (BRASS) and the payroll (CHRIS) systems to offer one system for financial reporting. BRASS data is used to provide City-Council-approved appropriation figures and management approved adjustments. CHRIS data is used to account for all payroll related expenses.

- Fraud Control - SAP includes certain fraud control processes. SAP generates on-line transaction tests for continuous auditing purposes. With on-line transaction processing, the City Auditor electronically samples and monitors high-risk transactions as needed.

  SAP ensures a strict separation of duties. Security profiles allow controls to be placed on certain transactions and permit only limited access. Strict security measures are in place to ensure separation from "create" and "approver" profiles, as well as to ensure broad segregation of duties. Approvals for a transaction are recorded electronically by user identification. This provides a more secure environment than other financial systems that process paper requiring signature validation.

  SAP generates reports when high-risk master data are changed, especially vendor master records. The reports will identify what was changed and who made the change.

  SAP systematically creates warrant numbers for payment. All warrants are printed from the approved electronic document. No printed forms or signature plates are necessary.

- Procurement - SAP's Material Management module allows end users to electronically create and monitor purchase requisitions, purchase orders, and goods receipts. Requisitions are entered on-line in SAP and approved through a series of workflow processes. The Materials Management module automatically updates the financial records as purchase commitments are made and goods are received. End user departments have more flexibility with SAP to issue requisitions for multiple funding sources and to monitor the progress of the requisition as it makes its way through the bidding processes.

- Contract Monitoring - SAP monitors approximately 600 procurement (requirements) contracts for commodity and general services. Each contract is created as a master data record in SAP. Data concerning vendor, contract dollar limits, contract number, delivery requirements, etc., are listed as part of master data. Phoenix can track releases, payments, and delivery history made against a particular contract. This monitoring tool enables staff to track contracts in an integrated environment with on-line, real-time information.

SAP also performs contract monitoring for almost 750 construction contracts. All capital improvement contracts are established in SAP. Phoenix staff can track payments, status of a project by phase (design, bid, construction, warranty, etc.), and by vendor. All approved change orders are entered into SAP to capture adjustments to project scope and completion time line. Change orders and payments processed against a project are tightly controlled. Phoenix staff can query the project to seek real-time information regarding the contract.

- ▪ Budgeting - Phoenix uses BRASS, now a product of American Management Systems Inc., for budget preparation and analysis. BRASS is used for both the annual operating budget and five-year capital improvement program processes. It is a client/server application with about 130 users Citywide. Line item estimates are entered by departmental budget analysts using on-line forms and are reviewed by Budget and Research Department staff as forms or reports. Position-by-position salary and benefits forecasts are also generated in the BRASS system. Standard and ad hoc reporting capabilities are available to all users, as is the ability to download information. The accounting and salary and benefit structures are similar to those in the SAP financial and CHRIS/PeopleSoft payroll and human resources systems. Budgetary actual results are interfaced from SAP to BRASS monthly and budgetary estimates for the current and upcoming year are interfaced from BRASS to SAP. CHRIS interfaces with BRASS to provide position and benefits information.

b. Human resources management (including workforce planning, recruiting, hiring, training, and performance evaluation).

Phoenix has an integrated human resources management system called City Human Resource Information System (CHRIS). CHRIS is the implementation of the PeopleSoft Human Resources Enterprise Resource Planning system that completely supports Phoenix's human resources needs. It was the first enterprise-wide, client/server system implemented by Phoenix and contains the following three modules: (1) PeopleSoft Human Resources, (2) Peoplesoft Human Resources Base Benefits, Benefits Administration, and Flexible Spending Account (FSA) Administration, and (3) PeopleSoft Payroll.

CHRIS/PeopleSoft Human Resources helps Phoenix attract, develop, and retain our most important asset - employees. CHRIS Human Resources provides immediate access to meaningful and accurate information about employees and easily automates and adapts human resources tasks and business processes. With CHRIS, Phoenix identifies position requirements, finds the right people for positions, and tracks their professional progress. CHRIS provides complete support for Phoenix's human resources needs, including personnel administration, position management, training administration, salary administration, health and safety, regulatory reporting, and benefits. The system is fully integrated so all employee information is immediately accessible. CHRIS automates record-keeping and routine tasks, freeing employees from repetitive processes and tedious data entry. Past, present, and projected information is retained and automatically applied to City specifications. CHRIS generates easy-to-read reports using standard or customized templates supporting improved forecasting and analysis. CHRIS creates "what-if" and "point-in-time" scenarios using effective-date information.

- • Personnel Administration - Using CHRIS, Phoenix hires employees, views job history, administers job changes, compensates workers, tracks worker competencies, tracks company property assigned to employees, and manages disciplinary actions.

- • Position Management - Using CHRIS, Phoenix creates positions for all or part of the organization with the ability to tie detailed information to each position, assigns employees to positions, cross-updates incumbent data automatically when position data is updated, and creates departmental budgets at various levels, such as job code and position. This information is interfaced to the Phoenix's budgeting system (BRASS) to forecast salary and benefit expenses.

- • Training Administration - Using CHRIS, Phoenix associates in-depth training programs with job code. Phoenix also specifies course requirements and training facility information, maintains course and

training program data for instructors and courses, monitors course session availability, reviews course evaluations, and tracks tuition reimbursements.

- Salary Administration and Planning - Using CHRIS, Phoenix maintains up-to-date salary plans, a critical element in reducing employee turnover and managing costs. Guidelines are established for administering and setting different pay rates for different job components. Phoenix processes annual salary reviews, merit increases, and pay reviews based on an employee's anniversary date. The performance review process is triggered by a report generated by CHRIS, indicating due dates. The actual performance review documents are prepared and maintained electronically at the department level using standard word processing software.

- Health and Safety - CHRIS helps monitor adherence to health and safety regulations, while reducing related costs. Phoenix reports incidents of injury and illness for employees and contractors, manages occupational injury and illness claims, reports incidents involving vehicles and equipment, and detects and monitors hazardous conditions and materials.

CHRIS/PeopleSoft Human Resources Base Benefits, Benefits Administration, and Flexible Spending Account (FSA) Administration enables Phoenix to design, implement, and manage a comprehensive, modern benefits program while keeping costs and labor at a minimum. Phoenix manages a wide range of benefit options, including medical, dental, life, and deferred compensation. Personnel status changes or events, such as family-status changes, new hires, and termination, are monitored to determine eligibility for specific benefits elections. CHRIS automatically processes retroactively created benefits and deductions for individual employees and groups. Enrollment of eligible participants and dependents is automatic for a variety of benefit options, including health, life, disability, and accidental death and dismemberment. Healthcare and dependent care FSA claims are administered on-line. Pledges are easily recorded, and claims processing, distribution reimbursements, check printing, and funds accounting are easily managed. The availability of a broad range of standard and customized benefits reports allows Phoenix to study the impact of programs and policies. "What-if" and "point-in-time" scenarios can be created using effective-date information.

- Base Benefits - Base Benefits enables Phoenix to manage a wide range of benefit options, including medical, dental, and life; define specific deductions and calculation rules for each benefit plan; calculate benefit deductions quickly and accurately; calculate multiple types of employee leave accruals; and specify primary care physicians. Base Benefits also handles the recording of Qualified Medical Child Support Orders, which require group health care plans to provide benefits to the child of a participant. Designation and maintenance of coverage rate schedules, comprehensive benefit calculation rules, and benefit-related payroll deductions are also a part of this component.

- Benefits Administration - This component allows Phoenix to manage and automate more complex benefits options, such as eligibility checking, open-enrollment functions, and event-maintenance processing. With event maintenance, personal status changes are monitored, such as family-status changes, new hires, and terminations. During these status changes, employees may become eligible to change their benefits elections, which can be done quickly and easily with Benefits Administration. Eligibility rules are defined based on Fair Labor Standards Act status, salary grade, and union category. Cross-plan validation can be performed that enables Phoenix to define a plan or coverage amount that is a prerequisite for enrollment in another benefits plan.

- FSA Administration - This component anticipates unique spending needs, such as employees with eligible healthcare or dependent care expenses. FSA Administration enables Phoenix to process these flexible spending account claims in-house so pledges, claims processing, funds disbursement, check printing, and funds accounting can be tracked quickly and smoothly. FSA claims are established as a benefit-related, pre-tax payroll deduction. The deduction is placed in a special account, and employees can later file a claim with the benefits department for cash. Disbursement checks are then processed and printed.

CHRIS/PeopleSoft Payroll provides all the tools to run an efficient payroll operation. The payroll system provides a solid, reliable approach to processing large volumes of payroll data, from payroll calculation and tax computation to check preparation, payroll reporting, and tax reporting. Unlimited payroll history is available on-line. Federal and state tax requirements are fulfilled with a complete, up-to-date set of tax tables that store all tax data. On-line timesheets are available to quickly view, enter, and adjust payroll information. Standard earnings and hours are established for employees, and pay is automatic. Hourly and salary pay rates, hours, additional earnings, tax methods, and accounting information can be reviewed and overridden. Proration of concurrent garnishments is automated; manual checks can be garnished; payments not subject to garnishment can be identified; and garnishment refunds can be processed. Payroll calculations can be run and re-run to ensure accuracy. Calculations can be adjusted, changed, or corrected as needed, then only the records that changed may be recalculated. During pay confirmation, the system updates all month-to-date, quarter-to-date, and year-to-date payroll accumulators. Effective dating is used to retain all past, current, and projected information. Pay may be automatically calculated based on hire or termination dates.

CHRIS Payroll turned payroll processing into a dynamic, accurate, and easily controlled operation. The innovative design and functionality of this module results in significant savings in data entry, calculation time, and manual intervention. The on-line system helps change the way Phoenix manages payroll information. CHRIS Payroll calculates gross-to-net or net-to-gross pay, leave accruals, and retroactive pay. Holiday schedules and payroll cycles are identified on-line, and the system automatically calculates imputed income, and processes unlimited direct deposits. Many standard or customizable payroll reports are available, such as the deductions register, payroll register, cost centers, other earnings register, deductions in arrears, deductions not taken, employees earnings, payroll summary, etc. Payroll expenses are interfaced to SAP to properly account for personal services costs. The interface of data also allows for one system to track personal services expenses versus budgeted funds.

c. Capital management (including monitoring capital projects, managing inventories, and tracking the condition of assets).

Phoenix has one enterprise-wide capital management system called SAP, which was discussed in question 1a above.

For capital projects, SAP provides an integrated system that ties together Phoenix's five-year capital improvement program, annual capital budget, expenditure data on a real-time basis, and Engineering and Architectural Services Department's project monitoring and administration.

SAP provides capital project managers, budget analysts, accounting analysts, engineers, and all levels of management with information to monitor individual projects, capital programs, and the entire capital program at whatever level of data is desired. This includes not only the project's budget during implementation, but the recording of the assets upon completion.

For asset management, accurate and timely information is available on fixed assets and is distributed to department heads yearly in the Fixed Asset Inventory Report. Fixed asset records are updated upon procurement of a fixed asset (capital item over $5,000 per unit) and the completion of capital improvement projects.

For plant maintenance, Phoenix is migrating its facility management function to SAP's Plant Maintenance (PM) module. This module plans and tracks preventive maintenance by each equipment type in Phoenix facilities. The system tracks and monitors requested improvements and emergency repairs to facilities. PM is integrated with all modules of SAP so inventories can be requisitioned, and general ledger postings and costing transactions can occur as a result of one transaction in PM.

For Inventory Management, Phoenix uses SAP to manage inventory warehouses. SAP notifies warehouse managers of low inventory levels and suggests re-order quantities. Managers may approve the order request on-line for issuance to a buyer in the Materials Management (purchasing) Division of the Finance

Department. The inventory component of SAP is integrated to impact the general ledger as items are removed from inventory.

Phoenix also uses dedicated, departmental systems to manage unique asset types, such as:

- Communications Management System (CMS) - manages Phoenix's 24,000 units of mobile and fixed radio equipment inventory. CMS tracks logistical information on each asset in more than 400 different classifications of radios. CMS captures and tracks physical location, preventive maintenance, repair history and use. CMS forecasts replacement of equipment based on this logistical information. This system is used only by the Information Technology Department (ITD).

- Equipment Management Information System (EMIS) - manages Phoenix's vehicle and equipment fleet, excluding Aviation an Public Transit departments. Presently, 5,438 units of equipment are in the fleet, of which 4,159 are motorized vehicles licensed to be operated on public roadways and 1,279 units are off-road equipment, varying in size from small trailers and maintenance equipment, such as lawn mowers and sprayers, to large earth-moving equipment, such as landfill scrapers and bulldozers. EMIS provides an on-line, interactive decision support system of vehicle maintenance and repair history, spare automotive parts inventory, and fuel inventory operations. This system is used only by the Public Works Department.

d. Managing for results (including measurement of program results or outcomes).

Phoenix uses numerous systems to manage its product development and service delivery. Each system has its own processes and measure for identifying, quantifying and reporting results. A few departmental examples of the use of technology in managing program results are listed below.

- Fire Department Response Time - The goal of the Fire Department (Fire) is to respond to an emergency call within 3 minutes of dispatching the call. Fire uses its Computer-Aided Dispatch (CAD) system to track response time for certain key transactions. First, Fire measures the time it takes to receive a call from the Police Department's 911 system. Fire then measures the cycle time to enter the call into the CAD system, then dispatch the requested fire station. Fire uses strict protocols to track the acceptance of a call by the fire station. If a call is not answered in the prescribed time, the call will be dispatched to a different station. Once the fire station accepts the call, the final cycle time measure is started: response time from dispatch to the emergency scene. Fire management uses statistics from CAD to make decisions. The CAD system can identify cycle time by station, by truck, and by shift. These results measures are used to help identify areas for performance improvement, as well as identify possible locations for additional stations.

- Development Services Plans Review – The Development Services Department (DSD) is responsible for enforcing the building code within Phoenix corporate boundaries. A step in the enforcement is the review and approval/denial of building permits. DSD has different performance goals for each type of plan review: Small (buildings under 5,000 square feet {sf}) – 14 calendar days; Large (5,000 to 50,000 sf) – 30 calendar days; Extra Large (over 50,000 sf) – 45 calendar days. DSD uses its KIVA system to track cycle time for plans review. The system starts tracking the review time once it is entered into the system and assigned to a plans reviewer. Management uses the resulting measurement to ensure a high-level of customer responsiveness and quality service. The results are published monthly for City Manager and City Council review.

- City Manager's Executive Report – The City Manager requires each department and function to measure both quantitative and qualitative results. These results are submitted monthly for inclusion in the City Manager's Executive Report. Each department electronically submits its monthly statistical data to the City Clerk Department (Clerk) for processing. Clerk staff loads the data into a spreadsheet that is linked to a word processing document. This document is formatted with graphs, charts and diagrams. The final product is a professional presentation of both organizational and departmental

performance measures. A copy of the City Manager's Executive Report is included as Attachment IT-A.

- <u>Employee Training</u> - The Personnel Department (Personnel) uses the CHRIS system to manage the Employee Development (training) program. As part of the management of the program, Personnel seeks participant feedback after each course in the form of a class evaluation. The evaluation seeks input regarding customer satisfaction, effective use of time, trainer preparedness and trainer knowledge. The evaluation data is entered into CHRIS for statistical analysis. Personnel uses the data to make decisions on subject effectiveness, trainer abilities, and overall program customer satisfaction.

- <u>Help Desk Management</u> - ITD operates a Help Desk function for enterprise-wide business systems. As part of the management of the Help Desk, data is captured to monitor response time from phone call to problem resolution. Statistics are also tracked to determine the frequency that problem resolution occurs within goal. Caller trends are analyzed to determine if additional end-user training is necessary.

- <u>Public Works Vehicle Routing</u> - Using Phoenix's Geographic Information System (GIS), Public Works re-evaluates vehicle routing as needed and performs "what if" analysis. Before GIS, the manual process of re-routing refuse trucks in Phoenix's 440+ square mile area was an overwhelming task. Because of that, the re-routing process was reviewed and revised only during contract negotiations. Also, under the manual process, "what if" analysis was much more costly. With the implementation of the GIS vehicle routing application, the re-routing effort was reduced from months to weeks.

e. Transmitting information to and receiving information from customers (including providing information to citizens and other stakeholders on the performance of Phoenix's programs and obtaining data that helps Phoenix assess customer/citizen satisfaction).

In 1994, Phoenix initiated a program to provide the public with electronic access to municipal information and services.   The objectives required that the solution be easy to use and have a consistent look and feel. Further, Phoenix citizens would be provided universal access and equity of service so that those without computers or Internet service could take advantage of the service. Special outreach programs targeting specific populations also were included in the project. This project resulted in the creation of *Phoenix At Your Fingertips (PAYF)*, which had its debut on June 30, 1995.

On May 17, 1996, the City Manager issued a policy that centralized all electronic citizen access coordination in ITD.   By policy, PAYF provides citizens with a single point of entry for Phoenix's electronic information and services. The policy further requires that ITD be contacted before departments started any electronic citizen access services. This coordination of information and services ensures the easiest, most consistent, and best possible electronic services and information for Phoenix's customers. This policy prevents Phoenix from having a kiosk-based solution for one type service located next to a terminal offering a different service, etc.   Just about everything that Phoenix staff is doing via phone, mail, or public-counter can be replicated and delivered via PAYF, including customer satisfaction feedback.   PAYF is limited only by the imagination when it comes to service delivery.

PAYF provides the public with up-to-date electronic information and services through the Web at www.ci.phoenix.az.us from 57 free public-access workstations at 38 sites, and dial-up access. The latter two make this service more broadly available than just a "home page." PAYF, available 24-hours a day, seven days a week, offers computer users free access to Phoenix City Hall at their convenience.
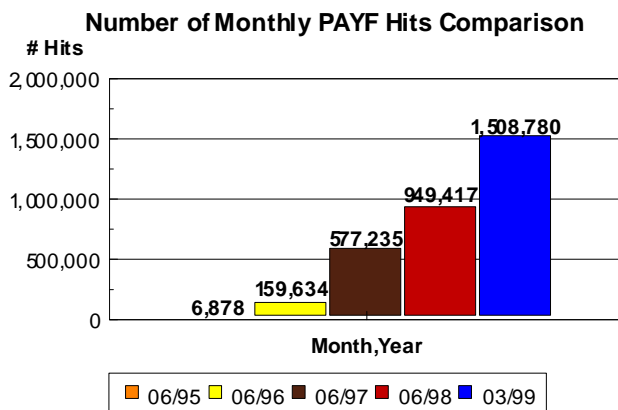
PAYF provides everything from:

- getting employment information to downloading a job application,
- obtaining City Council meeting agendas and back-up material to providing public comment and opinion, and
- downloading bid requests to supply goods/services to Phoenix to purchasing GIS data.

Members of the public or residents can get directly involved in their community, participate in special events, find out about Phoenix meetings and agendas, obtain assistance and learn about business opportunities. The public can send to and receive electronic messages from Phoenix staff and elected officials, access the public library and its vast resources, and access other agencies' web sites that further citizen services.

PAYF is one of the ways in which Phoenix routinely delivers service. In addition to publishing documents and other citizen material, customized on-line feedback and survey forms, applications, e-mail, registrations, and public comment forums can all be handled via PAYF. Databases, such as the Valleywide Electronic Community Calendar, also are available for citizen use.

PAYF is organized by topic from the citizens' point of view rather than the traditional approach that just provides links to departmental web sites. Using the topical approach helps citizens to quickly and easily find what they're seeking. This style of public access is in direct alignment with Phoenix's vision of providing "seamless service" for its citizens. The impact that PAYF has on the community can be measured by the ever-increasing number of "hits" per month. As seen in the chart below, the number of hits for the June 1995 debut of PAYF is 6,878. Compare that to 1,508,780 hits for the month March 1999, and the increase is evident.

Number of Monthly PAYF Hits Comparison

Hits

Month, Year	# Hits
06/95	6,878
06/96	159,634
06/97	577,235
06/98	949,417
03/99	1,508,780

Legend: ■ 06/95 ■ 06/96 ■ 06/97 ■ 06/98 ■ 03/99

Statistics are gathered on a monthly basis to determine the most commonly accessed services and menus.

PAYF has received much attention due to its uniqueness. In fact, PAYF recently won the National League of Cities' 1998 Innovation Awards "Harnessing Information Technology for Your City" in the public access category. PAYF also was selected as one of 20 finalists from more than 700 applicants in the international Bangemann Global Challenge for the public access and democracy category.

For internal staff access and communication, Phoenix's Intranet, Inside Phoenix, can be used in a similar manner to PAYF.   Inside Phoenix made its debut on June 30, 1997.   Inside Phoenix provides staff with information and services necessary in the performance of their duties, but makes it available upon demand, 24 hours a day, seven days a week.

One of the features of Inside Phoenix is the Seamless Service Directory (SSD). Phoenix staff can use this directory to obtain the information needed by citizens and eliminate the rerouting of calls. For example, if a citizen calls any department about a loose dog in the neighborhood, the staff person

can search for "dog" in the SSD, and it will display related phone listings and descriptions. The staff person finds the right listing and is able to get that information to the citizen on the first call. On-line SSD feedback and correction functions are provided for staff use.

Peer-to-peer agency services use what is called Agency-to-Agency home pages. This differs from PAYF in that it is not intended for the general public, but Phoenix staff access is available from Inside Phoenix. For example, the Phoenix Fire Department communicates with other fire departments to announce symposiums and training available for fellow firefighters, so this is available on an agency-to-agency home page and Inside Phoenix. The Engineering and Architectural Services Department provides secured on-line permitting for utility companies. In fact, the on-line permitting application was the first of its kind and has received much media and industry attention. These are not services that the general public or Phoenix staff can use, so they do not appear on PAYF or Inside Phoenix. These Agency sites can be accessed by specific customers at the discretion of the department sponsoring the home page.

PAYF, Inside Phoenix, and the Agency-to-Agency home pages are managed under one program called PhxWeb.   The technical infrastructure that provides interconnectivity is called PhoenixNet. Both PhoenixNet and PhxWeb were built upon a solid foundation, including the 10-year Architecture Vision, further discussed in question 4.

In addition to using PAYF and Inside Phoenix, Phoenix also conducts a biennial citizen survey. In July 1996, citizens were asked for the first time to rank Phoenix in its efforts to provide citizens with computer access to Phoenix information sources on a scale of 1 to 10 . The result was "*High recognition among citizen base of Electronic Services provided by the City"* – a ranking of 5.9, considered to be high for this type survey. Results from this survey will be used as a baseline for future surveys. Between the increased number of hits that PAYF has experienced and the steady flow of PAYF publicity, it is expected that the next survey will result in an even higher score.

2. **Please describe the ways in which Phoenix's current information technology system serves as a tool to help manage _programs_. (For example, how is information made available that permits managers to make day-to-day decisions in program execution?) Please provide three examples of valuable agency-specific systems.**

Phoenix has three corporate goals for using information technology systems to manage programs: (1) provides timely information; (2) requires no redundant data entry; and, (3) leverages dispersed data under the coordinated decentralized environment.

In addition to PhxWeb described above, Phoenix's GIS serves as another tool to help manage programs within Phoenix. Two other agency-specific systems also are described in this section - Call Center and Employee Development.

To best illustrate how GIS and associated software tools benefit Phoenix, the following six systems will be described:

1) Utilities Permitting Internet Map System - An agency-to-agency home page that partners with local utilities companies to facilitate work in Phoenix's rights of way.

2) Phoenix Youth and Education System - An enterprise, Intranet application that facilitates consistent management of youth-based programs across Phoenix.

3) Phoenix Maps On-line system - Provides on-line, real-time maps that aid in day-to-day business decision-making.

4) Liquor License Application System - Supports City Council in the approval of liquor license application requests.

5) GIS Land Information System - Provides parcel-based information for the GIS parcel layer and interfaces with numerous Phoenix business systems.

6) Environmental Data Management System - An enterprise application that facilitates the inventory, movement and reporting of hazardous materials used by City departments.

These are only a few of the many systems at Phoenix that provide benefits to city management, program managers, staff, external agencies and citizens.

Utilities Permit Internet Map System (PIMS) is an Internet application created to streamline the planning, design, and implementation processes of utility infrastructure construction and maintenance in Phoenix. PIMS utilizes the latest technology in GIS spatial data storage and Internet mapping tools to link multiple business data systems with spatial GIS data to provide licensed or franchise utility companies, serving Phoenix, with real-time interactive maps and up-to-date business information. In addition to the current customer base, it is estimated that approximately 150 new customers will be added to the system over the next few months.
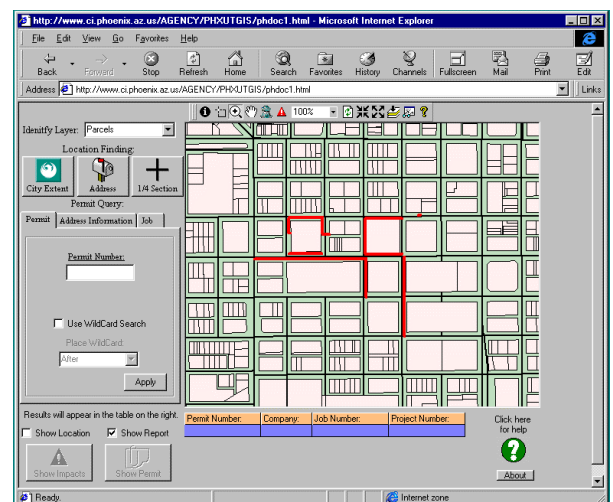
On-line accessibility allows utility companies to track progress of their permit applications, reduces time-intensive phone inquires, lowers the number of applications being returned for correction, cuts travel time by the utility companies, facilitates the design and planning processes, and frees time for staff to process applications. One consultant was quoted in a national publication as saying, "We estimate that the Internet system will cut our costs by 30 percent. We are thrilled with Phoenix's state-of-the-art capabilities. For many reasons, this is a win-win situation for everyone in the community."

In addition to reducing cycle time for the permit processing, PIMS is designed to foster communication between the utility companies and help identify joint trenching opportunities. Joint trenching not only reduces the overall cost of development, it minimizes pavement cuts in Phoenix rights of way reducing disruption to neighborhoods. Another benefit of the system is that customers can view real-time property maps, water and sewer drawings, and other Phoenix records to determine possible locations for new utilities. With full zoom-in, zoom-out, and query capabilities, customers have access to more than 20 GIS map layers including engineering quarter sections (parcels, streets, rights of ways and easements), various utilities, police stations, schools, parks, fire stations, and capital improvement projects. Companies can obtain property addresses, legal descriptions and easily identify potential impacts that may require ingress and egress mitigation measures and plan for them up front or avoid them all together.

Phoenix was able to leverage the development efforts of the PIMS map engine application by embedding calls to the engine directly into the Engineering and Architectural Services Department Utilities Permitting business system. Staff is able to see the same real-time maps at their desktops through Phoenix's Intranet, thus augmenting their business processes. This project has been a great success and is another example of how GIS is being used in Phoenix to help internal staff at their desktops as well as improving services to our external customers.

Phoenix Education and Youth System (PEYS) is an enterprise, Intranet system developed to capture and maintain information about youth-based programs offered by Phoenix. An inter-departmental interview process was used to gather functional requirements from 18 Phoenix departments. Partnership among the City Manager's Office, various Phoenix Departments and ITD, allows PEYS service providers to maintain, track, and plan youth programs in our communities. Much effort went into determining common definitions of services to help identify overlaps and gaps in services being provided.
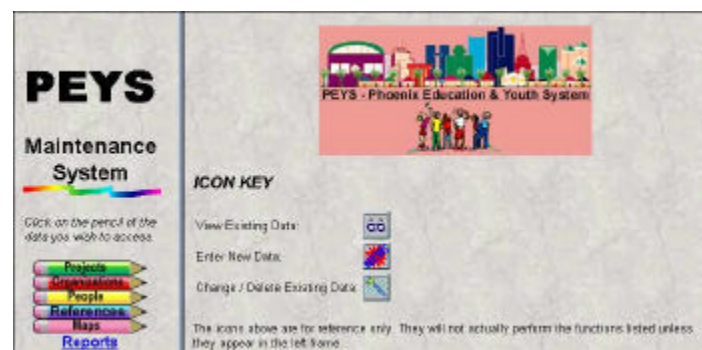
PEYS includes centralized scheduling that allows managers to see, for the first time, what youth-based programs are being offered by various departments, where and when they are offered, and who is providing the service(s). PEYS also provides current school calendars to assist in avoiding conflicts in scheduling and allowing program managers to better plan services. The result is a more consistent and professional delivery of services to citizens.

Before this initiative, each department tracked its youth services independently. With the implementation of PEYS, not only will managers have a consistent management tool, but will be able to communicate more effectively with internal staff as well as external agencies, organizations and citizens. Youth program information will be available on-line for Phoenix staff and mailings can be targeted to individual(s) and/or group(s), internal or external to Phoenix, concerned with specific youth-based issues.
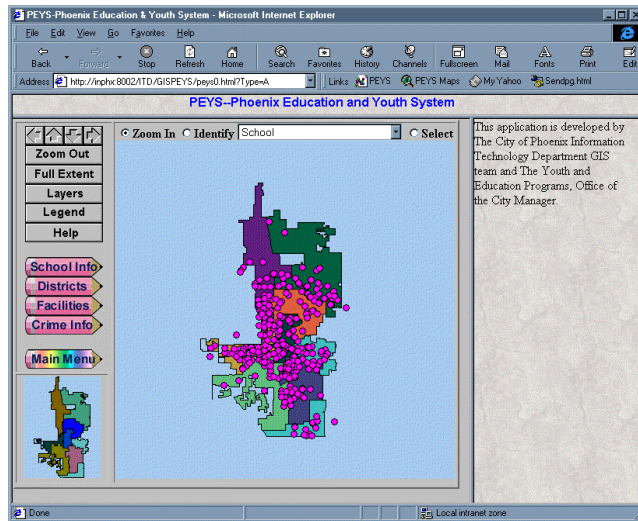
Additionally, built in mapping capabilities provide managers with the ability to graphically visualize where services are and are not being provided, analyze certain demographic and crime statistics to identify and understand their audience, and target services to achieve the most benefit. PEYS is also being deployed using Phoenix's current Intranet environment providing cost-effective access to the greatest audience. Representatives from various departments are being trained and included in the user acceptance testing to ensure that functional requirements are being met for Phoenix as a whole. A sample of various PEYS map products are included as Attachment IT-B.

A copy of the presentation prepared for the PEYS Steering Committee outlining project goals, technical architecture, types of data being captured, and mapping functionality embedded within the application is included as Attachment IT-C.

Phoenix Maps On-line system (PMO) is a robust, custom-developed GIS that allows departments and citizens to view electronic, real-time maps and associated tabular information. This system was implemented using shared licenses to place important information on as many customer's desktops as possible in the most timely and cost-effective manner. This eliminated the need for customers to travel to a centralized location to research answers on paper map rack sets. This system also provides the most up-to-date information available and improving the quality of business system data as well. PMO is simple to use, includes on-line documentation to assist customers, and GIS staff are available to assist as needed.
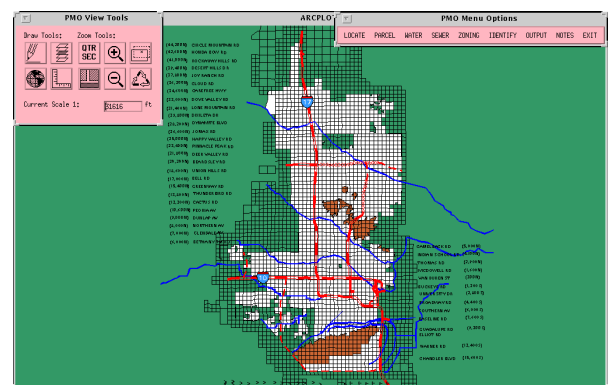
A PMO focus group was formed to allow departments to share information with each other and provide input for future releases of the product. This focus group is made up of 14 departments and meets regularly during normal work hours. ITD provides regular training classes each month for general staff and custom training to departments on an as-needed basis. By combining an enterprise infrastructure, customer involvement and a complete training program, the PMO system has grown to more than 400 customers and is still growing. The following list is additional ways that PMO assists various customers in day-to-day decision making:

- Provides an electronic link to the Land Information System to research various property-based information including site address(es), legal description (subdivision, lot, block, tract, and narrative legal), assessment information, and property ownership.

- Creates mailing labels to notify property owners and/or residents aiding several departments with neighborhood notifications such as proposed zoning changes, street construction, and neighborhood issues.

- Development Services staff review with customers parcel information and current zoning during the building permit issuance process. They use aerial images in relationship to parcel boundaries to determine setbacks for building permits. Other graphic information that is important to the building permit process includes council district and impact fee areas for reporting and price determination.

- Neighborhood Services reviews current property zoning and historic preservation information to enforce neighborhood maintenance and zoning violations.

- PMO includes the following administrative boundaries
    - Council/Congressional Districts/Legislative
    - Police Precincts/Beats
    - Fire Districts
    - Parks
    - School Districts
    - City Limits
    - Village Boundaries
    - Various Neighborhood Preservation Areas
    - Landfills
    - Golf Courses
    - Water/Sewer Yards
    - Water Customer Areas

- PMO includes the following infrastructure layers for use by multiple departments for development and planning issues
    - Parcel Boundaries
    - Zoning
    - Aerial Photos
    - Water/Sewer infrastructure
    - Easements
    - Right of way
    - Freeways
    - Street Network
    - Speed Limits
    - Floodplains
    - Canals
    - Quarter Section

- For the purpose of obtaining information to facilitate City Business, citizens may view PMO at Phoenix public counters with staff assistance.

Mapping capabilities can help management visualize where services are being provided in relationship to the types of incidents they are trying to reduce and/or prevent. A copy of the PMO Users Manual is included as Attachment IT-D.

Liquor License Application System is a customized GIS application developed for the City Clerk Department
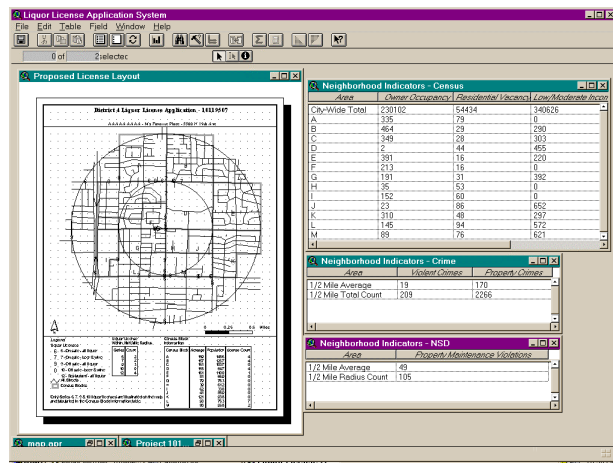
to determine, display, and document important factors that are within a specified proximity of a given liquor license application address. Factors include items such as neighborhood demographics, crime statistics, and proximity to churches, schools, and establishments with current liquor licenses. This document is then submitted with the application for City Council members to use in determining approval or denial recommendations. This application is an example of how spatial analysis combined with multiple data sources can assist government officials and managers in critical decision making processes.

Land Information System (LIS) is an enterprise tabular system that was developed to maintain parcel-based data within Phoenix to support GIS initiatives. This system provides customers the ability to view information including: Assessor Parcel Number, parcel address(es), deed and ownership information, legal description, property assessment information and parcel genealogy. Automating this information allows customers to view and acquire parcel-based information in various ways that meet their individual business needs. Regular training classes are conducted for customers needing access to the traditional client/server application.
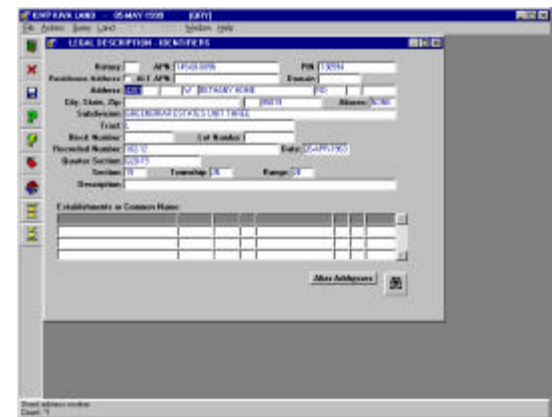
Several departments access LIS through direct database links. By integrating current business systems through a standardized parcel number, location, and/or legal description, information can be shared among departments to improve business processes and services. Below is a listing of information technology business systems and departments that rely on database links to LIS to acquire various property-based information. These systems are further described in Attachment IT-E.

- Liquor License Application System - City Clerk Department
- Council Issue Tracking System - City Manager's Office
- Development Services Information System - Development Services Department
- Utilities Permit Internet Map Server - Engineering and Architectural Services Department
- Utilities Permitting System - Engineering and Architectural Services Department
- Phoenix Maps On-line - Information Technology Department
- GIS data maintenance applications - Information Technology Department
- Neighborhood Maintenance & Zoning Enforcement Case Management System - Neighborhood Services Department
- Zoning Case Management System - Planning Department
- City Serve - Public Works
- City Serve Application - Streets Transportation Department
- Water Internet Map Server - Water Services Department
- Arc/INFO and ArcView ad-hoc analysis and mapping - various departments

The various departmental business systems validate property information, find ownership information, review assessment information, acquire owner and/or resident mailing information, and display parcel-based information on maps.

<u>Environmental Data Management Systems</u>

Facilitated sessions were attended by all departments that use, store, move, and report on hazardous materials as part of their daily activities. As a result, a request for proposal was prepared and distributed. The many proposals received were evaluated and Essential Technologies Inc. was selected as the vendor of choice. The components of their suite of products that were purchased by Phoenix specifically address the following:

- Chemical Information
  - hazardous materials inventory
  - materials safety data sheet information

- Facility Information
  - facility/site characterization/information

- Emergency Operations
  - hazardous materials and materials safety data sheet information
  - facility hazardous materials locations and quantities
  - emergency resource management information

The components were installed in a client/server environment and are used by numerous departments. This not only provides information about all hazardous materials that are housed in Phoenix buildings, but allows maintenance of inventory levels, movement from one location to another, and also provides the ability to generate the required government reporting of hazardous materials. In addition, they are also in the process of providing access by Phoenix fire trucks to materials safety data sheets via PAYF. This will allow firefighters to know which hazardous materials exist at their destination, how toxic they are, what their chemical components are, and what safety precautions should be taken.

Other GIS projects in progress include 1) a coordinated effort between numerous departments to provide interactive maps to the public at large via the Internet, 2) making maps available to Water Services field staff to view and update map information via pen-based technology, and 3) supporting the Development Services Department in embedding mapping capabilities within their integrated permitting system. Initiatives on the horizon for the enterprise team include upgrading the Spatial Database Engine, completing a more robust and accurate corporate street centerline to be used by all departments, edge-matching major corporate layers, and enhancing the current hardware, software, and data infrastructure. Departmental initiatives include creating additional custom GIS programs, training staff in Phoenix's standard GIS tools, embedding mapping functionality within additional business systems, and making maps available to field staff and external customers.

In addition to programs using GIS tools, the Call Center is another example of information technology helping to manage programs:

<u>Call Center Program</u>- The Call Center program manages both the ITD Help Desk and the Phoenix Operators. Each of these functional areas maintains software system tools that facilitate managing departmental and citywide programs. Information Management (INFO) is a software tool used by the Help Desk to manage the following processes regarding various computer systems throughout Phoenix: Problem Management, Change Management, and Configuration Management.

- <u>Problem Management</u> - INFO captures detailed problem descriptions and resolutions, and keeps track of date and time audit information indicating when the problem call was received, when someone was dispatched to work on the problem, when the problem was resolved, and when resolution was verified with the customer. All problems receive a priority rating and are tracked from inception to resolution. INFO contains fields to record the diary (freeform) information from the receipt of the call to the resolution verification with the customer. Another field allows the resolver to note the cause and subsequent solution of the problem. Statistical reports can be generated from this data that support management decisions for making changes to staffing, procedures, or training.

- **Change Management** - Change Management is the discipline of planning, coordinating, and implementing changes to the data processing production environment. The objective of Change Management is to ensure that changes made to resources represent an acceptable balance of risk, resource effectiveness, and potential disruption to our client service. A change is any activity that modifies the production environment and/or can potentially cause a problem. INFO tracks modifications regarding hardware, network, web, procedures, utilities (environmental), application software, and system software. Audit information is logged, and the diary information stores details on implementing the change, assessment of risk, testing and recovery procedures, backup procedures, change notification and approvals, documentation requirements, etc. Change Management procedures are located on Inside Phoenix, Phoenix's Intranet, for staff reference.

- **Configuration Management** - This portion of INFO creates historical records about computer hardware, such as purchase information, equipment location, network connections, and service information. Help Desk personnel maintain these hardware records, and dispatch repair personnel as necessary. Statistics regarding frequency and type of service can assist management when making procurement or service decisions.

  ITD is currently seeking to replace INFO with software that will allow web access to e-mail and pager systems and have the capability of accessing other databases, such as CHRIS, SAP, and SSD phone directories.

- **Phoenix Operators/Seamless Customer Service** - The operators utilize Dynamic Network Administration (DNA) to connect all calls placed to the Phoenix switchboard to any department or employee. DNA provides each operator with caller information and seamlessly connects the caller to his/her destination using DNA via the SSD, Phoenix's on-line telephone directory. The DNA software runs on an Windows NT platform and receives information directly from the Ericsson telephone switch.

The Employee Development Program serves as the final example of how information technology systems serve as a tool to help manage programs:

Employee Development Program - The Phoenix Personnel Department (Personnel) effectively uses information technology for the management of its Employee Development Program. The Program provides training to Phoenix employees in multiple categories: career development, computer training, financial management, personal development, supervisory development, management development, quality and productivity, workplace wellness and safety. A copy of the Employee Development & Training Catalog is included as Attachment IT-F.

Technology is employed in the enrollment, scheduling and tracking process. Personnel uses the Training Administration component of the PeopleSoft Human Resources application (CHRIS). Personnel is able to specify course requirements and training facility information, maintain course and training program data for instructors and courses, monitor course session availability, review course evaluations, and track employee tuition reimbursements.

Employees seeking training can either view the catalog on-line on Phoenix's Intranet (Inside Phoenix) or via hardcopy. The employee submits a training request to his/her department training liaison who, in turn, uses CHRIS to determine course availability and place the employee in the requested course or on a waiting list. Personnel uses the waiting list function to determine if additional courses are required to fill the demand. The liaison receives notification of course acceptance or waiting list placement through Phoenix's electronic mail system. The liaison then notifies the employee. This process assists field staff who do not have access to electronic mail.

This system also maintains a training history of employees having attended Phoenix-sponsored classes. This is used to validate course prerequisites and document progression of employees' training benefit.

3. **To what extent do Phoenix's financial and human resources managers have to rely on multiple information technology systems to obtain the information they need to make decisions, generate reports, or conduct daily operations? (For example, does Phoenix's chief financial officer need to obtain data from multiple information systems to support financial management?)**

    Phoenix uses SAP for financial management and CHRIS for human resources management. In compliance with the organizational goal to leverage dispersed data as described in the response to question 2, these two systems transparently provide fully-integrated data sets.

    SAP is Phoenix's primary financial management system. SAP has fully-integrated accounts payable, accounts receivable, inventory, purchasing, fixed asset, costing, capital improvement and general ledger modules. Other financial related support systems, including budget appropriations, are interfaced with SAP to provide one system for financial reporting. Support systems are permitted only if SAP cannot support a business need.

    CHRIS Human Resources provides immediate access to meaningful and accurate information about employees and easily automates and adapts human resources tasks and business processes. With CHRIS, Phoenix identifies position requirements, finds the right people for positions, and tracks their professional progress. CHRIS provides complete support for Phoenix's human resources needs, including personnel administration, position management, training administration, salary administration, health and safety, regulatory reporting, and benefits. The system is fully integrated so all employee information is immediately accessible. CHRIS automates record-keeping and routine tasks, freeing employees from repetitive processes and tedious data entry. Past, present, and projected information is retained and automatically applied to City specifications. CHRIS generates easy-to-read reports using standard or customized templates supporting improved forecasting and analysis. CHRIS creates "what-if" and "point-in-time" scenarios using effective-date information.

    Both SAP and CHRIS were previously described in detail in response to questions 1a and 1b, respectively.

4. **Please answer the following questions about information technology management structures:**

    a. Does Phoenix have a centralized information technology management structure (where some city department, office, or agency is responsible for making policy decisions on citywide acquisition and management of technology) or a decentralized structure? (If some activities are centralized and others are decentralized, please explain.)

        Phoenix has what is best described as a "coordinated decentralized" or "federated republic" information technology management structure. ITD is responsible for establishing citywide technology standards, policies, and guidelines, as well as establishing Phoenix's information technology architecture framework.

        In the late 1980s, Phoenix began planning for its move away from what can be described as "islands of automation" (decentralized environment) in which departments employed whatever technology served their own department's needs. At that time, Phoenix had disparate computer applications and e-mail systems; therefore, citywide data sharing and communication was limited.

Decentralized Information Technology Environment

Aviation — Bull
Parks/Rec/Library — Sequent
Court — Bull
Equal Opp — IBM
Water — IBM
Streets — Mod Comp, IBM
Devlpmt Services — HP
Law — Wang
Personnel — IBM
City Clerk — Wang
Public Works — HP
Human Services — HP
Finance — IBM
Police — UNISYS
Fire — DEC, Wang
Transit — Quantel
Housing — Data Gen.
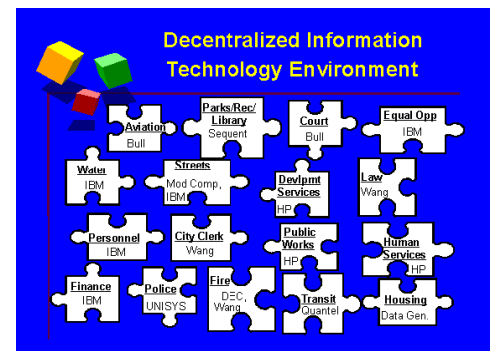
In the early 1990s, plans were implemented to move Phoenix toward what is called a "coordinated decentralized" environment. City Departments are able to continue to use their creativity when it comes to information technology solutions without being stifled in achieving their department's mission, but within certain frameworks established by ITD.   These frameworks ensure citywide data sharing and communication.

Coordinated Decentralized Information Technology Environment
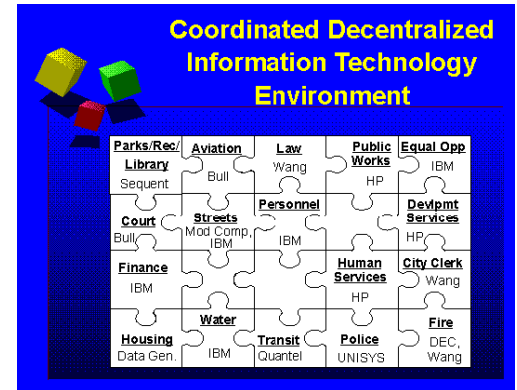
Information Technology Policies, Standards, and Guidelines
One of the earliest frameworks, implemented in 1991, is Phoenix's "Information Technology Policies, Standards, and Guidelines" manual. The manual reiterates policies from the City Manager regarding citywide information technology concerns, such as the planning and acquisition of technology, Year 2000, software management, etc.   The manual also provides specific standards in terms of desktop software/hardware, LAN hardware/software/cabling, Enterprise network accesses and operation, etc., in support of achieving the 10-Year Architecture Vision (described below).

To ensure citywide coordination of information technology , ITD depends upon departmental representatives:

• Information Technology Contacts - Every department and function has a contact assigned to the information technology area. The contact evaluates new or revised policies and standards, disseminates information to his or her department, and shares information and experiences with other Departments. Meetings are conducted on a monthly basis to bring in new technologies, describe new initiatives, provide project status, or demonstrate other systems of interest.

• Local Area Network (LAN) Administrators - Every department has a LAN Administrator. This group meets bi-monthly to discuss LAN topics and issues.

• Y2K Project Leads - Every department and function has a Y2K Project Lead because of the critical nature of the citywide Y2K coordination project. This group meets as needed to obtain critical information, provide project status, and disseminate project information.

• PhxWeb Coordinators - Every department and function has a PhxWeb Coordinator.   This group meets as needed to demonstrate new available services, provide project status, etc. PhxWeb Coordinators are responsible for approving and prioritizing service requests, serving as "emissaries" to encourage the use of PhxWeb, and disseminating PhxWeb-related information to department/function staff.

• SSD Liaisons - Every department and function has an SSD Liaison responsible for creating and maintaining their department's SSD data. Since the initial training sessions on using the SSD on-line maintenance features, most communication is conducted via e-mail.

A copy of the Information Technology Policies, Standards, and Guidelines manual is included as Attachment IT-G, and are available on the web at www.ci.phoenix.az.us/phxitd.html. (It should be noted that some of the standards are presently being revised and will be republished shortly.)

10-Year Architecture Vision
Phoenix's "10-Year Architecture Vision" was developed in 1992 and is a rolling 10-year plan that is annually updated. The Vision addresses three major goals of Phoenix:

▪ Community: Create and maintain a well-informed and involved community that exists within a clean and safe environment, is supported by efficient transportation systems, and provides a quality education system and economic opportunity for all citizens.

- Services: Provide cost-effective, high-quality community services through a productive, efficient organization and empowered work force.

- Fiscal Strength: Generate and maintain dependable revenue flows and sound financing arrangements that support community service needs within a system of rational resource allocation.

Bringing government closer to the citizens, effectively delivering services, and providing services in a cost-effective fashion requires continuous re-evaluation of service delivery methods. Information technology plays a key role in creating effective, interconnected service delivery for Phoenix government. The Vision serves as a bridge between the overall goals of Phoenix and the specific information technology plans and projects undertaken by City departments. A copy of the 10-Year Architecture Vision is included as Attachment IT-H and is also available on the web at www.ci.phoenix.az.us/phxitd.html.

Information Superhighway Policy
In 1994, the City Council adopted Phoenix's Information Superhighway Policy that recognizes the importance of an advanced telecommunications infrastructure to benefit business, community, and government. In order to achieve the vision of the Policy, Phoenix developed a strategic plan and long-term commitment to implementing PhoenixNet. The PhoenixNet Strategic Implementation Plan assumed several phases, each building upon the other to reach the long-term objectives established in Phoenix's Information Superhighway Policy. Careful planning went into the strategic plan to ensure that each phase of work represented an integral building block to the larger overall goal, but also demonstrated immediate value. A copy of the Information Superhighway Task Force Report policy is included as Attachment IT-I.

City Manager Leadership
Critical to accomplishing any successful project is the visible support of executive management across the board.

For example, in regard to Phoenix's Phoenix At Your Fingertips (PAYF), the City Manager issued a policy that centralizes all electronic citizen access coordination and describes PAYF as providing citizens with a single point of entry for Phoenix's electronic information and services. Further, it requires that ITD be contacted before departments start any electronic citizen access services. The policy recognizes that coordination of information and services through PAYF ensures the easiest, most consistent, and best possible electronic services and information for our customers. A copy of the policy is included as Attachment IT-J and is also available on the web at www.ci.phoenix.az.us/MANUAL.

The combination of these frameworks helps to build the solid foundation upon which departments can implement information technology solutions.

b. If information technology management is centralized, what does the central department, office, or agency do?

ITD is responsible for developing and maintaining the above-described frameworks (establishing information technology standards, policies, guidelines, plans, etc.) and to ensure that the enterprise infrastructure exists to support current and future service delivery requirements.   The 10-year Architecture Vision is crucial to accomplishing this mission so that departments are in alignment with Phoenix's overall information technology direction.

ITD encompasses the enterprise network (PhoenixNet), intra/internet services (PhxWeb), geographic information systems (GIS), telecommunications (phone and radio), applications development, data center operations, database administration, data administration, information technology consulting services, and enterprise-related project support, such as Year 2000 and 800 MHz radio replacement.

c. Is there a single person (such as a Chief Information Officer) in Phoenix responsible for information technology management? If yes, where in Phoenix's organization is that individual located? To whom does

the Chief Information Officer (CIO) report? (If there is no single person responsible for coordinating technology, please explain how information technology is coordinated.)

Yes, under the "coordinated decentralized" environment described above, the Information Technology Director (Chief Information Officer) is responsible for Phoenix's information technology management. The Director reports a Deputy City Manager in the City Manager's Office. A copy of Phoenix's organizational chart is included as Attachment IT-K.

d. If Phoenix has a CIO, what are his or her responsibilities?

The Information Technology Director oversees the open network architecture in a distributed communications environment that provides access to Phoenix's data by all end users. The director is responsible for achieving the critical balance between departmental autonomy and centralized management with regard to significant technology matters within a mixture of client/server, web-based and mainframe coexisting environments. The director is also responsible for setting priorities for the use of information technology throughout Phoenix within a broad framework of standards, guidelines, and forums, and establishing a formal citywide information technology budgetary plan.

The director establishes citywide standards for hardware and software to ensure quality, functionality, connectivity, and compatibility through the use of computer hardware and software to conduct City services. The director is ultimately responsible for development, implementation, and maintenance of applications systems, operation of the centralized data processing center, establishment and maintenance of a standard charge-out distributing system for services, and maintenance of acceptable service levels for City user departments. The director oversees a continuous program of education and research to assure citywide standards are maintained and the cost-effective use of ITD resources. Some of the basic functions of this position include:

- Establishes guidelines and programs for effective information technology management;
- Plans, organizes, coordinates, and directs the activities of ITD;
- Recommends long-range and short-range management information systems plans and budgets to City management;
- Approves staff recommendations on major systems development and/or research projects;
- Establishes citywide strategic policy for planning, development, and design of information needs;
- Researches management information systems hardware and software including applicable vendor applications, data base management, and operational control packages;
- Sets policies to ensure data privacy and security;
- Establishes guidelines and programs for effective database management use;
- Consults with and advises other division and department heads on information technology management needs and problems.
- Demonstrates continuous effort to improve operations, decrease turnaround times, streamline work processes, and work cooperatively and jointly to provide quality seamless customer service.

A copy of this position's job description is attached as Attachment IT-L and is also available on the web at www.ci.phoenix.az.us/JOBSPECS/09920.html.

5. Please answer the following questions about information technology planning:

a. Please summarize the planning process for information technology in Phoenix (this would include, but not be limited to, the process of planning for the procurement and management of major hardware and software systems and packages). How is the planning process for information technology acquisition and management informed by the overall mission or goals of Phoenix, or of individual city agencies?

For the past four years, Phoenix has combined information technology planning with the budgeting process to form one citywide process. This single citywide process provides essential information about the status of departments' technology investments and maximizes Phoenix's allocation of resources available for

technology. The Information Technology (IT) Plans assure that computer technology aids interdepartmental communication and sharing of information and that incompatibility or inadequacy of technologies does not become a barrier to these goals.

The annual information technology planning process requires each department in Phoenix to submit an IT Plan along with funding requests for technology enhancements to support or implement the plan. The IT Plan includes information outlining the department's status in implementing computer technology and a brief description of the department's multi-year technology goals for a three-year period. The IT Plan also identifies departmental technology issues, how the requested technology will resolve these issues, how long it will take the department to complete the technology implementation, and how far along the department is in implementing its IT Plan. Special citywide program areas are identified by ITD that each department must address within its plan. For the fiscal year1999-2000 planning process, these special program areas included:

- Year 2000 Computer Software Corrections Program

- Migration to and Implementation of City Hardware and Software Standards Program

- Internet/Intranet/Web Technologies Program

- Network Expansion and Connectivity Program

- GIS Program Initiatives

In addition to the above special program areas, each department IT Plan includes major program areas for its department providing details on current status, long-term goals, and specific goals for the funding year.

The Budget and Research Department reviews the IT Plans from a short- and long-term funding perspective. Budget and Research also consolidates budget requests from all departments for the upcoming fiscal year and distributes a copy of this consolidated report with a copy of each department's IT Plan to ITD. ITD reviews all IT Plans for adherence to standards and conformance to Phoenix's 10-Year Architecture Vision. ITD meets individually with each department and a representative from Budget and Research to discuss the IT Plan and budget requests. These meetings allow the department an opportunity to highlight their departmental technology priorities. After the meetings, ITD ranks each budget request based on citywide and departmental technology priorities on a three-point scale (essential to dispensable). The budget request report is updated with ITD rankings and returned to Budget and Research. Based upon technology funding levels established by Budget and Research and rankings by ITD, Budget and Research notifies departments of approved budget allocations for technology.

Two sample plans are included: ITD's IT Plan as Attachment IT-M and Engineering and Architectural Services' IT Plan as Attachment IT-N.

ITD also administers the citywide Office Automation and Information Sharing (OA/IS) bond-funded program. The purpose of this program is to promote enterprise system sharing. Results of this program can be seen in the standard desktop environment that all Phoenix staff have for e-mail, calendaring, word processing, etc., as well as PhoenixNet's infrastructure and network connectivity in all City buildings. The combination of these results makes enterprise-wide data sharing and communication easy. OA/IS also undergoes an annual planning and budgetary review process in which ITD ranks the highest priority citywide initiatives and provides funding based on availability.

To help departments develop technology plans, ITD developed an Enterprise Engineering methodology. Once departments had an understanding of the technology, a companion business planning guideline was developed for departmental use. The combination of these two tools helps departments quickly re-evaluate business processes and then procure the technology best suited to their needs. A copy of both the methodology and guideline are included as Attachments IT-O and IT-P, respectively.

Another planning tool bases itself in Phoenix's IT Plan, which stresses a goal of building integrated business application systems and taking advantage of data sharing and re-use opportunities. To facilitate the creation of integrated business system applications, ITD implemented a subscription service that allows faster, more

accurate and complete identification of user requirements and identifies potential areas for data sharing opportunities.

This service is the Municipal Reference Model (MRM) from Chartwell Inc. of Ontario, Canada. The MRM service includes a model of generic programs, services, and resources collected through many government projects conducted by Chartwell, as well as a methodology for conducting a business area analysis.

When ITD starts the analysis phase of a project to build an integrated business application, all of the departments that are affected or will be involved with the end product are assembled. Facilitated sessions are conducted using related portions of the MRM generic model in conjunction with the methodology that allows user and data requirements to be readily and accurately identified in a much shorter period of time than was previously possible. The methodology and generic model both allow the flexibility necessary to accommodate simple or complex projects as well as variety in the types of attendees. It surpasses the previous method of conducting individual user interviews over long periods of time, which made it difficult to get consensus on what information was needed and how it should be defined and maintained. Additionally, it is advantageous to have all of the departments in the same session, hearing the same concerns and issues, and jointly identifying needs, requirements and resolutions.

ITD used the MRM methodology and generic model on three different projects when conducting business area analysis activities for building integrated business applications. An enterprise data model was created and metadata was collected about the information in the enterprise model. The results of each of the MRM sessions were incorporated into the enterprise model. Also, those results were fed back to Chartwell Inc. and then incorporated into their model, which is redistributed to all subscribers periodically. The information gathered during the sessions is organized into a business area analysis document that is used as input into the next phase of the project, whether it be the preparation of a request for proposals, the purchase of a third-party product, or the next step in the systems development life cycle.

Response to the facilitated sessions conducted by ITD was positive, and more requests are being received for similar project activities. Attendees at the sessions were surprised at how much they learned about other department functions, the amount of data redundancy, and how much duplication of effort was occurring.

Use of the MRM model and methodology, an enterprise data model, and the creation and maintenance of enterprise metadata were incorporated as part of Phoenix's data management strategy.

b. Do you have both strategic-level and tactical-level (annual operating or business) plans? If so, please describe the relationship between these plans.

Yes, ITD has a strategic-level plan, referred to as the Operational Plan. Each project within the Operational Plan has its own tactical-level plan. If the program or project is not on the Operational Plan, no resources should be assigned to work on it. The Operational Plan is a multi-purpose planning tool that:

- assists ITD in prioritizing its workload.
- quantifies support decisions to defer or reject additional work.
- improves employee resource forecasting for new projects and programs by comparing actual hours reported in the timekeeping system to forecasted hours in the Operational Plan.
- highlights those functional areas that require additional resources, identifying the potential need for budgetary requests.

The Operational Plan is an inventory of all ITD projects and programs to be worked on during a 12-month period and is updated quarterly. Each ITD employee has the work he/she performs identified in one or more projects and/or programs. Projects are simply defined as a distinct body of work with a start and end date. Ongoing programs are fixed in nature and must be done in order to maintain the existing operations of the department.

The Operational Plan is prepared by representatives from all divisions and sections of the department. Each project and program identifies the necessary employee resources required to perform a specific body of work. Many projects and some programs require resources from other functional areas. To assure all projects and programs have the necessary resources identified at the appropriate allocation level, a planning session is held quarterly for all Operational Plan representatives.

At the end of this process, consolidated reports are generated and distributed. These reports give ITD an understanding of the amount of work facing the department for the upcoming year and an opportunity to determine whether sufficient resources are available to accomplish that work.

Based on the Operational Plan, individual projects or programs have a tactical or implementation plan, and information from the Operational Plan is rolled down into the implementation plans. Program/Project managers are typically the ones involved with the Operational Plan and are also responsible for the development and maintenance of implementation plans. For example, PhxWeb is on the Operational Plan as an ongoing program, but "listserv" is on the Operational Plan as a separate project, with a specific start and end date, with assigned resources and priorities. The PhxWeb Project Manager uses that information to develop an implementation plan for the "listserv" project.

Project implementation plans are routine for ITD because projects typically involve cross-functional departmental resources, and that requires additional coordination and organization that can be handled through implementation plans.

A copy of the First Quarter 1999 ITD Operational (strategic) Plan and the "listserv" project implementation (tactical) plan are included as Attachment IT-Q.

c. How many years do information technology procurement and management plans cover (both government-wide and agency-specific plans)? When were they last revised?

Through the citywide IT Plan process previously described in the response to question 5a, each department updates its three-year IT plan on an annual basis. Focus for these IT Plans is on the upcoming funding year, which requires detailed budget technology requests.

Both the previously discussed OA/IS bond fund plan and the 10-Year Architecture Vision are reviewed yearly.

d. To what extent is information technology procurement consistent with the information technology plan? Please provide evidence of the linkage between the plan and procurement decisions.

With the existing IT Plans process, information technology procurement **is** consistent with IT Plans. The IT Plans must adhere to the 10-Year Architecture Vision.

As previously described in the response to question 5a, departments develop technology funding requests as part of the citywide IT Plan process. Although IT plans address technology as a whole, the budget requests are for commodity and capital purchases of hardware and software. As part of this process, Budget and Research and ITD review and approve all procurement of hardware and software for the upcoming fiscal year. ITD additionally sets priority for funding the budget requests from a citywide perspective. Those requests having a greater citywide benefit receive a higher ranking than those that just support departmental or divisional needs. Budget and Research provides each department with a report detailing funding allocation for specific hardware and software items. During the program budget process in which departments request new programs, any new technology programs must tie back to the department's technology plan.

6. **Please describe how Phoenix measures the performance of its information technology management systems. In particular, how does Phoenix accomplish the following:**

    a.   Evaluate anticipated benefits (monetary and non-monetary) of proposed systems (for example, Benefit-Cost Analysis, return on investment, efficiency improvement, etc.)

Evaluating the anticipated benefits of proposed technologies in Phoenix consists of several steps and processes. Because many benefits are difficult, if not impossible, to quantify in monetary terms (e.g. what is the value of providing a homebound citizen with electronic access to government?), evaluation does not focus solely on financial analysis such as return on investment or cost/benefit analysis. Non-fiscal methods such as focus groups, surveys, task forces, best practices research, and expert advisory services are used to evaluate the intangible benefits in conjunction with financial analysis for those components of an initiative that can be monetarily quantified.

For example, when Phoenix decided to investigate the viability of implementing an Intranet in early 1997, a citywide taskforce was established. Representatives from key departments that provide internal services, such as Finance, Personnel, ITD, City Clerk, Budget and Research, and Public Information Office were selected to participate. Several other departments such as Fire, Police, Water, and Parks, Recreation and Library expressed a strong interest in participating as well. The Task Force worked together with industry experts to define what an Intranet is and describe some of the tangible benefits that could be anticipated. In brainstorming sessions, the Task Force identified a specific set of diverse internal services that could be offered electronically and would be of broad interest to Phoenix staff. Criteria for selecting the best initial services were established and used to assess the appropriateness of proposed services for the first phase of the project. With a carefully defined scope for the initial phase of the project, Phoenix moved forward with a "pilot" that required minimal expense and resources to test the concept. The Task Force also established success criteria and methods of measurement to evaluate the results of the "pilot" phase. User input was critical to this evaluation. Once value was established, Phoenix proceeded with a more substantial rollout of the infrastructure. The Intranet Task Force report is included at Attachment IT-R and is also available on the web at www.ci.phoenix.az.us/phxitd.html.

Another example is the analysis performed by the City Auditor department regarding telecommuting. Through the use of internal focus groups, departmental surveys, other government agency surveys, review of Phoenix policies and programs, and other research, the City Auditor was able to identify the impact and non-monetary costs associated with various approaches to offering telecommuting as an option under the alternative workplace program. A copy of the findings is included as Attachment IT-S.

Traditional cost/benefit analysis and cost comparisons are performed on specific components of technology when possible. For example, in making a selection of certain technology options when the benefits are substantially equal (e.g. selecting a specific software or hardware product), total cost comparisons are made to evaluate the options. In the past few years, this type of analysis resulted in the establishment of several site licensing agreements that have resulted in substantial savings citywide for technology commodities such as database licenses, office automation software, maintenance agreements, lease versus purchase, etc. A cost comparison is included as Attachment IT-T.

The Enterprise Network study conducted in late-1996 is a typical example of ITD commitment to efficiency improvement. ITD regularly reviews its assets, resources, and the environments supported to determine where improvements could contribute to improved customer service levels. Rather than complete a project and attend to it only through remedial maintenance actions, ITD periodically reviews all supported systems. This review is designed to assess the continued viability of the technology employed in light of industry advances and changes, along with an updated assessment of the business need being serviced.

In the example of the Enterprise Network Study (included as Attachment IT-Y, and described in detail in Question 8b), the assessment identified the increasing demand for network bandwidth generated by newer client-server business solutions. Improved efficiency of the new business applications was achieved by implementing the recommendations of this study. First, a new Enterprise network topology, Asynchronous Transfer Mode (ATM), was introduced that provided a 15-fold increase in available network backbone capacity. Second, shared networking through the use of traditional hubs was eliminated and switched

networking was introduced giving each user on the enterprise network a dedicated 10 megabit apportionment of the total available bandwidth on the user's particular network subnet. The result of implementing these two recommendations was an immediate increase in data transmission efficiency Citywide, and an infrastructure capable of efficiently supporting the City's new technology growth into the next century without a requirement for further bandwidth expansion.

Another example of anticipated benefits is presented in the following two cases in which Phoenix bid along with private competition to provide services. Phoenix has long been a leader in providing a venue for public/private competition of Phoenix-provided services. The most notable examples include solid waste disposal, ambulatory service billing, and landscape maintenance. In addition to these better-know competitions, there are two awards in the information technology field: data entry services and microwave communication equipment maintenance. The bidding processes were used as a mechanism to identify the lowest cost service provider at a pre-defined level of service quality.

Data entry services for Phoenix have historically been provided by staff from ITD. To determine whether data entry services could be provided at a lower cost by a private contractor, Phoenix issued an invitation for bid in early 1991. ITD and a private contractor were the respondents. ITD was awarded the bid. In 1996, an internal audit performed by the City Auditor department identified the total cost incurred by ITD over the five-year term of the bid was $330,458 lower than the proposed amount. The cost savings were realized without negatively impacting customer service.

Microwave equipment maintenance services were supplied by a third-party vendor. The microwave equipment supports 30 telephone and radio communication paths for both public safety and general Phoenix users. Phoenix issued an invitation for bid in May, 1998 to seek the lowest cost service provider. The ITD was awarded the bid at a three-year cost savings of approximately $300,000 over the contractor's rate.

b. Evaluate actual benefits of existing systems. (If Phoenix does not do this now, does it intend to? If so, how?)

Following the same concept presented in the first part of this question, every effort is made to evaluate non-monetary benefits of existing systems along with the monetary. Through many of the same techniques of focus groups, surveys and post-evaluation studies, benefits are identified and evaluated. Wherever possible, input from citizens, customers and end users is incorporated into these efforts.

For example, the PAYF project collects usage statistics and seeks feedback from users of the system. Citizen e-mail comments and questions are retained in a database for analysis. Monthly summaries are published electronically, indicating most-used areas and levels of satisfaction. All reports are available at www.ci.phoenix.az.us/STATS. Citizen and support staff surveys were conducted for target groups such as citizens with disabilities when assistive technologies were incorporated into the citizen access infrastructure. The senior outreach program also underwent survey analysis to determine the quality and satisfaction with the company providing the training to "train-the-trainers," who in turn were surveyed by their students, who were surveyed by the citizenry being trained. The senior outreach program received a circular survey so that changes could be effected that the citizens would see as a result of their comments. Specific questions designed to determine public awareness and satisfaction with PAYF also are included in the semi-annual City of Phoenix Community Attitude Survey.

Another component of the PAYF project was a formal grant closing report. The report included a community impact evaluation that was based on the number of hits the web site generated and the top services accesses. The evaluation also included citizen comments, lessons learned, as well as specific information on reaching the goals and objectives. A copy of that evaluation report is included as Attachment IT-U and is available on the web at www.ci.phoenix.az.us/phxitd.html.

Additionally, Phoenix uses multiple performance measures in the management of its information systems. Some measures are communicated monthly to the City Manager's Office through the City Manager's Executive Report process as previously described in the response to question 1d. Measures are also

communicated to the Budget and Research Department, City Manager, City Council and Citizens through the annual budget process in the form of Service Level Trends. The following is a sampling of performance measures, both quantitative and qualitative, used by Phoenix information technology managers.

- Information Technology Help Desk:

  - Percentage of questions answered without referral, measuring the effectiveness of the Help Desk staff.
  - Total number of calls.
  - Cycle time for both responding and solving of problem calls for all levels of priority (e.g., 1, 2, 3, 4).
  - Frequency that problem resolution occurs within goal.
  - Customer satisfaction of Technical Support and Training personnel.
  - Trend analysis to determine recurring system or end-user training issue.

- Information Technology Computer Operations:

  - Total number of computer production jobs completed and the percentage of jobs completed on time (customer driven) daily, measuring the efficiency and effectiveness of the Computer Operations staff, as well as customer satisfaction with meeting expectations.
  - Total number of data entry keystrokes (daily, weekly, monthly, annually) by individual and application, determining staff and application efficiency.

- SAP Financial Management System:
  The SAP technical staff uses the Computing Center Management System embedded in SAP to provide both technical and functional performance measures regarding the application. Each measure can be viewed at the system level or by each functional module (e.g., financial, costing, general ledger, etc.).

  - Application response time.
  - Number of requests processed.
  - Amount of database used.

- Radio Communications:
  Radio Communications staff utilizes the Communications Management System to capture performance statistics and is used in the management of Phoenix's radio and microwave communication system.

  - Number of units maintained.
  - Average time of repair.
  - Percent of equipment downtime.
  - Cycle time of vehicular installation.

7. **Please describe how the procurement process for hardware and software works in Phoenix.**

Procurement for hardware and software in Phoenix is streamlined due to the established 10-Year Architecture Vision and the Information Technology Policies, Standards and Guidelines previously described in the response to question 4a. Under this framework, the Finance Department is responsible for the procurement of commodities, materials, equipment, and non-professional services, as well as all equipment leases, rental and maintenance agreements.

The Finance Department fairly and impartially makes purchases through open competition and gives equal opportunity for vendors to participate in the procurement process. The Finance Department adheres to the ethics set forth by the National Association of Purchasing Management and the National Institute of Governmental Purchasing. The City Manager has delegated to the Deputy Finance Director in charge of purchasing the administrative approval for all purchases amounting to less than $20,000. The City Manager also has delegated to departments and functions the authority to purchase incidental and non-recurring goods and services costing

$1,000 or less. Administrative Regulation 3.29 outlines this responsibility. Petty Cash purchases of less that $100 are also allowed for unusual or infrequent expenditures.

Departments must follow Administrative Regulation 1.85, Acquisition of Information Technology, for the planning and procurement of information technology. As described earlier in the response to question 5a, Phoenix has an extensive information technology planning process. Departments must seek prior approval from Budget and Research and ITD to purchasing technology. The majority of all approvals are received during the annual IT Plans process. The Finance Department ensures that requesting departments have followed planning processes before procurement.

a.   For commodity (for example, off-the-shelf PC's and software) items, does Phoenix negotiate master contracts from which agencies can make purchases directly from vendors? What percentage of commodity purchases does this cover? What is the process for creating master contracts? How long does it take Phoenix to procure commodity items not covered by master contracts?

Phoenix has established master contracts for certain types of hardware and software items which support the information technology standards established by ITD. Phoenix refers to these contracts as Requirements Contracts. Phoenix manages the following Requirements Contracts: Pentium Computers, Microsoft Software, Hewlett Packard Printers and Hewlett Packard Printer Supplies. Requirements Contracts are awarded via a Request for Proposals (RFP) or Invitation for Bids (IFB) process and are established to process repetitive purchases quickly. Phoenix also negotiates software site licenses whenever possible and feasible. An example of some current site licenses are: Lotus cc:Mail, Lotus Organizer, some GIS products, and Intel/Symantec anti-virus.

Phoenix also uses a cooperative purchasing agreement with the State of Arizona to procure goods and services off contracts awarded by the State. This saves Phoenix time and money in not having to issue its own RFP or IFB. Phoenix takes approximately eight weeks to establish its own Requirements Contracts. Purchases in excess of $1,000 not covered by a contract are processed in less than 14 days.

ITD has also entered into master agreements with specific "systems integrator" vendors for strategic applications. ITD has a master purchasing agreement with Environmental Science Research Institute (ESRI) for our GIS hardware, software, consulting and training. ITD also has a master agreement with Hewlett Packard for SAP-specific UNIX hardware and consulting services. ITD also negotiated a site license for its enterprise network operating system (Novell) and its two main enterprise databases (Oracle and Informix). These contracts allow Phoenix to procure necessary items in a timely fashion as well as ensure adequate systems integration without disruption to the operations environment.

The use of City and State contracts account for approximately 75 percent of Phoenix's computer and software purchases.

To further assist departments make timely purchase decisions, the City Manager has delegated to departments and functions the authority to purchase incidental and non-recurring goods and services costing $1,000 or less. This delegation has allowed departments to timely acquire goods and services, specifically small computer peripherals or distinct (but standard) software packages.

b.   For major software and hardware procurements that require Requests For Proposal, generally how long does it take Phoenix to acquire planned hardware and software (i.e., what is the time from initiation of the Request For Proposal to the beginning of roll-out/implementation)? Are there any major obstacles that slow down this process?

Phoenix issues RFPs for many major software and hardware purchases. The implementation of these systems can be viewed in three different categories (based on scope and business impact): small, medium, and large. The average length of time for system implementation after initiation of a Request for Proposal to implementation is 8, 14, and 20 months, respectively. The most recent examples of major system purchases include: PeopleSoft (CHRIS), SAP, telephone management system, and enterprise printers (production-quality, high-speed lasers). The major obstacles that slow down the process include the

development of complex specifications/requirements, the criteria and process used in evaluations, obtaining sufficient and qualified support staff for implementation, and ensuring the operations of current systems as they are being replaced.

To help alleviate the latter two obstacles, Phoenix acquires system implementation services (e.g., database, operating system, system analysis, application development) from contract labor. Phoenix acquires the services via the RFP/IFB. In some cases, the providing vendor may not have sufficient staff to provide such services. In those instances, Phoenix is able to quickly acquire professional technology services through the use the Qualified Vendors List (QVL) for Information Technology Professionals.

The QVL for Information Technology Professional Services procures technology including services as well as hardware and software. The QVL is published annually beginning in June 1994. A copy of the July 1998, Information Technology Professional Services QVL is included as Attachment IT-V. The Request for Qualifications for Information Technology Professional Services released on April 2, 1999, is included as Attachment IT-W.

For the past two years the RFQ for the QVL has been available to vendors on the Internet. The RFQ identifies and describes 28 information technology service categories. Firms who qualify and are placed on the QVL may be selected without a further RFQ or RFP process to provide information technology professional services to specific departments and/or functional areas of Phoenix. In this manner, engagements with vendors on the QVL can be made in less than 48 hours.

The list that is developed may be used by a department in cases where a relatively minor engagement of services is needed, a quick selection of a firm is needed, the scope of work is not sufficiently defined to permit an RFP process, a type of service is routinely used, or other such reasons. Phoenix, however, reserves the right to waive use of the QVL on any information technology project where, in Phoenix's judgment, competitive bids through an RFP process or other forms of solicitations may be more appropriate, such as in major or complex procurement of services. Departments have the flexibility to use either the RFP or expedited QVL process.

Once it has been determined that use of the QVL is appropriate and approval is given, the department and/or functional area requiring information technology professional services will contact firms on the QVL that provide the services needed. Those firms will be asked to provide specific qualifications and price quotes for the project at hand in order for an appropriate decision to be made by Phoenix before final recommendations and contract award being made. Qualifications and specific skills will be equally considered along with cost in determining the most responsive firm in meeting the needs for a contract award. The QVL expedites the RFP/RFQ process by already having qualified firms.

8. **Please answer the following questions about the implementation of information technology projects:**

    a. How does Phoenix monitor information technology projects and programs during roll-out/implementation. (For example, who is responsible for monitoring them? What aspects of the information technology projects are monitored?)

    Phoenix's approach in monitoring information technology projects and programs during deployment varies depending upon associated scope and risk of the effort initiated. Typically, the greater the scope and higher the risk of the effort, the more structured and well-defined the approach. In our typical enterprise-wide information technology deployment projects, Phoenix relies on well-defined, cross-functional project teams that emphasize project and transition management techniques to mitigate much of the risk associated with such an undertaking.

    The overall project organization begins with its highest level of monitoring capability, usually at the executive level and is generally referred to as the project steering committee. A project steering committee is generally comprised of directors of departments most involved or impacted by the deployment of the new technology. A steering committee functions to initially approve project plans and strategies and then meets

periodically to review status of the project in process, and set direction and establish new policies required by the deployment of the new technology. A steering committee has the authority to determine the best course of action to remedy situations that would otherwise result in an out-of-control or runaway project.

The next level of the project organization is the project management team. For large scale projects, several project managers may work together to ensure both the smooth daily operation of the project, as well as a smooth transition to the new business operations resulting from the implementation of new technology. The project manager role is responsible for overall project planning, coordination, issue resolution, and day-to-day monitoring of the work teams. The transition manager role is responsible for planning and executing the communication process, business operations planning, user training, and the formal acceptance of the new technology for production operations. When the project scope incorporates vendor products, including hardware, software, and applications, vendor representatives may join the project management team to help manage their respective areas. Regardless of how many roles the project management team comprises, the project manager is considered the first among equals and has the ultimate responsibility for successful project operations.
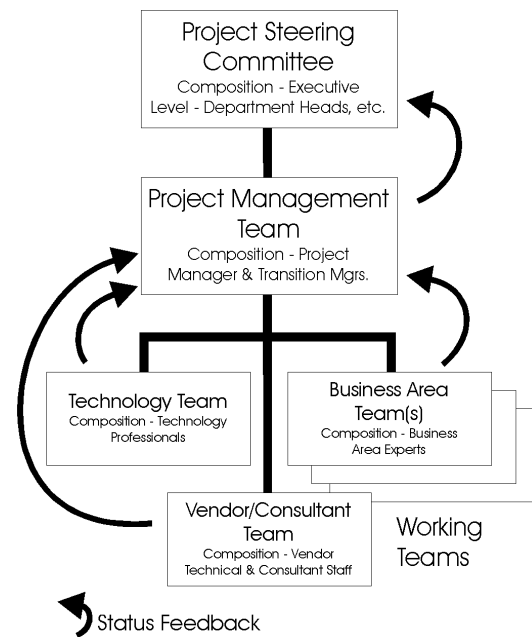
The next level of the project organization consists of working teams. Again, the number, type, and size of the working teams will vary based on the scope of the effort. Teams may be formed for business process development, application modification, hardware and software installation, communications network support, end user training, and other areas required because of the nature of the new technology being implemented. Each work team may have a lead person whose responsibility includes keeping the team's efforts on track in addition to their own work contribution to the team's mission. Work teams usually will provide daily status reports and provide roll-up summary status to the project manager on a weekly basis. Additionally, work teams receive support from the project management team in the form of intense coaching and problem solving.

Large-scale project monitoring using our three-tier project organization structure facilitates the effective monitoring of projects on a basis that is similar to a 360-degree evaluation. This means that project status and major deliverables are viewed from the perspective of the work teams, transition management (end user perspective), project management, and steering committee (executive perspective). Our experience with this project organization approach has been successful in implementing enterprise-wide resource planning systems such as CHRIS and SAP. Each of these efforts was large in scope and considered to be high risk; nevertheless, each was implemented with minimum disruption to business operations, although hundreds of end-users were affected by the implementation of these new technologies. Furthermore, this approach has been scaled down to meet the needs of smaller projects. Included as Attachment IT-X is a representative project charter and planning framework which is representative of this three-tiered project organization approach.

Through department efforts to monitor and manage information technology projects, some departments recognized the need for project management assistance. Accordingly, ITD recently initiated a program of assistance for departments not wanting to develop their own project management capacity, known as the Enterprise Project Office or EPO. The EPO, upon the request for its services, has the capability of establishing an appropriate project management organization with a project manager and project management tools that facilitate achieving a successful project outcome. In addition to providing direct support and standardized approaches to a department's information technology projects, the EPO can train staff in the methods of organizational transition and help integrate under-utilized parts of the department

with project operations. An example of this organization's goal and objectives is the attached charter for its operation and is included as Attachment IT-X.

b. If Phoenix has done any impact analyses for information technology in the past two years, please describe these and provide copies of these analyses.

Phoenix conducted three areas of impact analysis in the past two years: PhoenixNet, SAP, and PAYF.

By early 1996, Phoenix had become reliant upon its enterprise network, PhoenixNet, for delivery of all significant business applications. The network extended to all central city buildings and supported over 4,000 users. Further, a plan was in place to incorporate approximately 200 remote locations into the network before the end of calendar year 2000. ITD began to closely monitor network bandwidth use because of the number of business applications being accessed enterprise-wide, the total number of users, and the growing dependence upon office automation tools such as mail and calendaring.

In mid-1996, a study was commissioned to determine the impact of PhoenixNet's continuing rapid growth upon its future ability to deliver required business services to City employees without degradation. As part of this study, the independent analysts were tasked to assess and confirm Phoenix's estimates on current network bandwidth demand and average and peak network loading, the bandwidth demand by business service and time of day, and the increased bandwidth demand of planned, proposed, and anticipated client/server business applications, including SAP, PeopleSoft, GIS, budgeting, etc.

The impact study's critical goals were to:

1. Recommend a network enhancement and expansion plan that would ensure sufficient bandwidth availability to support Phoenix's anticipated growth demands through the end of the century.

2. Ensure that the proposed network topology would support all new client/server systems and services that complied with Open Systems concepts and standards.

3. Ensure that the network would support Enterprise level monitoring and management to maintain its reliability and serviceability with a minimum requirement for additional support personnel.

4. Provide a methodology for an ongoing review process to ensure that Phoenix expands its network infrastructure ahead of the demand for new services, thus providing a continuing foundation upon which to base the delivery of business services in the future.

The study was completed in September 1996, and its recommendations were approved in early 1997. The resulting project upgraded Phoenix's shared Ethernet network to a high-speed switched ATM network with full redundancy for all Enterprise server connections. The major portion of the ATM network providing service delivery to an increased total 5,500 nodes in the central downtown area was completed by December 1997. Since that time, the expansion continues to Phoenix's outlying service centers and sites providing citizen access to our services. To date, more than 65 remote sites have been added to PhoenixNet, raising the total network node count to more than 6,500. A copy of the completed study is included as Attachment IT-Y.

SAP was also the subject of a recent analysis conducted at Phoenix for assessing the organizational impact of implementing a new financial management system using SAP application software. It is not uncommon with the implementation of a major enterprise-wide technology-based system that shifting workload, skills, and organization issues will result from the decentralization of services, centralization of technical support, and assimilation of new capabilities.

The decentralization of services often equates to staffing issues. Services that were centralized before the deployment of new technology may be distributed throughout the organization, possibly requiring staffing reductions in some areas and increases in others. Training also can be a large issue with such a shift, requiring retraining of existing staff as well as training of new staff. Similarly, an organizational adjustment may be required to establish centralized technical support for new enterprise-wide technology. In addition to creating a new organizational unit for such support, the issues of additional staffing and training to support the new technology must be recognized and addressed. Lastly, in order for such an implementation

to be successful, the organization at large must effectively assimilate the new capabilities ushered forth by the new technology. For example, departments must be capable of accessing and using information from the new system and to replace old workflows with new workflows that take advantage of the additional capabilities provided by new technology.

To address these many issues associated with implementing SAP, Phoenix's Comprehensive Program Budget Review (CPBR) process was used to assess its impact. The CPBR process, which is an overlay to the annual budget development and IT Plan process (described in question 5a), involves special management and City Council scrunity of programs. In this case, CPBR was used to address the issues of concern surrounding the change to SAP. The CPBR for the financial management initiative is included as Attachment IT-Z.

Finally, another area of program evaluation centered around Phoenix At Your Fingertips (PAYF). In October 1994, a $50,000 federal grant was awarded to Phoenix to develop the PAYF. In October 1995, a $225,000 federal grant was awarded to Phoenix to provide universal access and service to all its citizens. The two grants were from the Telecommunications and Information Infrastructure Assistance Program, National Telecommunications and Information Administration, U.S. Department of Commerce. Included in the grant requirement was quarterly program evaluations and, at the end of the three-year grant period, a final program evaluation report.

The report included a community impact evaluation that was based on the number of hits the web site generated and the top services accessed. The evaluation also included citizen comments and a discussion of the lessons learned, advice to others interested in modeling PAYF, as well as specific information on reaching the PAYF's goals and objectives. A copy of that evaluation report is included as Attachment IT-U and is available on the web at www.ci.phoenix.az.us/phxitd.html.

c. Under circumstances where changes to an information technology implementation plan are warranted, please describe the extent to which the technology procurement and purchasing policies and procedures in Phoenix are responsive and flexible enough to accommodate such changes. Who must approve these changes (for example, procurement officials, budget officials, or the chief information officer)? How much time is required at each stage of the approval process when changes to existing plans are initiated?

As previously described in the response to question 5a, an important requisite for the acquisition of information technology is the preparation of an annual IT Plan. This process results in operating budget allocations to each department.

Subsequent to the budget adoption process, circumstances specific to a department may require changes to the department's IT Plan. When this occurs, the department must submit a notice of change to the Budget and Research Department for approval. In the event the requested change is determined to be a significant variance from what was originally set forth in the department's IT Plan, Budget and Research will forward a change request to ITD for assessment. The criteria for this assessment includes: determination that the acquisition does not meet technology standards; the acquisition deviates from the prevailing technology architecture, vision definitions, or enterprise-wide technology plans; the acquisition establishes a new or technological change to the existing network; and, the acquisition relates to an item on ITD's special interest list. The special interest list contains potential enterprise system solutions, such as automated vehicle location, imaging, video transmission, wireless communications, etc., that require ITD coordination. If ITD's review determines that the department's requested change is inconsistent with any of the foregoing categories, the department prepares a waver request, justifying the need for the requested change. If approved, the department, with budgetary approval from Budget and Research, may go forward with a revision to their IT Plan and acquire the technology in accordance with that Plan.

To better serve the departments in administering the IT Plan review process, departments are encouraged to coordinate with ITD at the earliest possible stage of planning and to submit those requests that require review early in the decision-making process. Departments also are asked to avoid intensive planning and requirements specifications efforts that focus on technology that meets any of the assessment criteria for

ITD review before obtaining ITD concurrence. ITD reviews requests on a timely basis; however, the amount of time required for any given review can vary according to the complexity of the request. For changes to existing IT Plans, ITD has a goal of three business-days to respond to change requests; again, the review period may be extended based on the complexity of the change requested. For planning purposes, departments can anticipate that requests requiring only ITD coordination will be processed within three weeks from the date of receipt. In some cases, the nature and magnitude of the request may require that the request be reviewed by the City Manager's Office, in which case, the review process also may extended.

Overall, the process for reviewing changes to a department's IT Plan proves to be responsive and flexible, while fostering increased consistency throughout Phoenix.

9. **Please describe the ways in which information sharing is automated in Phoenix. In particular, how well does the technology system allow information to be shared across city departments and agencies? How well does it allow information to be shared between levels of government in cases where such information sharing would be useful for management (for example: in welfare, criminal justice, education, or transportation)? Please provide examples of cases where this information sharing has occurred.**

In the late 1980s, Phoenix adopted an open, non-proprietary technical architecture, which is described in the 10-Year Architecture Vision. At that time, and as previously described in Question 4a, Phoenix had several disparate computer systems and e-mail systems. Those departments with Hewlett-Packard couldn't communicate with the IBM mainframe, which couldn't communicate with the Wang/OASIS system, thus creating the "islands of automation." To share information, paper copies had to be duplicated and distributed or files copied onto diskettes and then delivered.

When the shift to coordinated decentralization took place, the basic rule was, and continues to be, if more than one department needed access to the function, an enterprise-wide solution was warranted. The results of those solutions are documented in the Information Technology Policies, Standards and Guidelines manual. The 10-Year Architecture Vision also plays a major role in keeping departments in synch.

Today, Phoenix has one enterprise e-mail system and an integrated calendaring system that staff throughout Phoenix use to communicate with each other, regardless of their assigned departments or physical location. Diskette exchanges as a method for file sharing has been eliminated and far less paper is being used for distributing information.

Through the identification of enterprise systems, Phoenix has one financial system (SAP), one human resources system (CHRIS), one GIS, and one PhxWeb (Internet and Intranet)--there is no need for departments to build their own similar systems. Also, the amount of redundant data stored throughout Phoenix has been greatly reduced and Phoenix has begun to reap the benefits of data standards and relational databases.

Electronic sharing of information is routine for all Phoenix departments. The answer to which information technology system the "sharing" should occur on is primarily based upon the audience. Phoenix has four audiences: citizens, peer agencies, citywide staff, and departmental (including subsets) staff. Those four audiences are treated in a hierarchy in which citizens are at the top and departmental staff are at the bottom. The determination is:

1. If information sharing with citizens/public, it resides on PAYF, and the other four audiences are served through links from Agency-to-Agency home pages and Inside Phoenix to PAYF.
2. If information sharing with peer agencies, it resides on Agency-to-Agency pages and the other 3 audiences are served through links from Inside Phoenix to the Agency page.
3. If information sharing with other staff outside the department, it resides on Inside Phoenix.
4. If information sharing within a department, then it resides on Inside Phoenix or a departmental server.
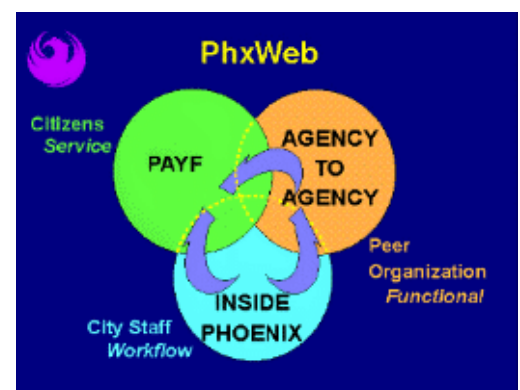
For Phoenix, it is not a question as to which service do we handle which way - it is the intended audience that determines the appropriate service delivery. For example, our education material that schools, peer agencies, and staff can access is on PAYF. The Municipal Court Call Calendar, for their contracted public defenders, is on an Agency-to-Agency home page. PhxWeb is described in further detail in the response to question 1e.

Enterprise system applications, such as SAP and CHRIS, that do not yet have a web interface are delivered directly to the staff's desktop as needed.

Phoenix shares data with the County of Maricopa, the State of Arizona, and other public and private organizations. In the past, a new data sharing agreement was created each time new data was to be shared between Phoenix and any other organization. This resulted in the generation of many individual data sharing agreements, each with its own level of detail and content. Each time additional data was to be shared with an organization that was already receiving Phoenix data, a new agreement was created.

Recently, a new data-sharing agreement was created. Because Phoenix both provides data to other organizations and receives information from other organizations, the document was designed to meet both situations. It consists of a Master Data Sharing Agreement that is executed the first time that Phoenix provides or receives data from another organization. A Data Sharing Arrangement is also created with the Master Data Sharing Agreement. However, when additional data needs to be received by or provided to an organization that the City already has an agreement with, only an additional Data Sharing Arrangement must be executed to address the new data. The agreement documents consist of the following:

- Master Data Sharing Agreement – identifies the provider and the recipient of the data to be shared. It also includes information that is more static in nature such as terminations, restrictions, limitations of liability, responsibilities, modifications, default, conflicts of interest and waivers.

- Data Sharing Arrangement – identifies the details of what data will be shared, who will use it, how it will be used, the purpose of sharing the data, the duration and retention of the data, any associated charges or costs, and addresses confidential and proprietary information for each specific type of data sharing arrangement.

A "Guidelines for Preparation and Use" document also was created to identify just when a data-sharing agreement is necessary, how one is prepared, processed, and maintained. It also defines the role of the people and departments involved in the process. A copy of a data sharing agreement is included as Attachment IT-AA.

None of this would be possible if it were not for the PhoenixNet enterprise network infrastructure that provides the physical connectivity for Phoenix. Phoenix's building standard requires that Phoenix buildings and workstations be wired for PhoenixNet access. PhoenixNet is discussed in greater detail in the response to Question 10c.

Additionally, Phoenix and ITD have been instrumental in establishing the Central Arizona Electronic Village (CAEV) Coalition, a coalition of organizations and individuals interested in helping people in the Phoenix metropolitan area use electronic communications technologies to access local community information and dialogue. By fostering cooperative efforts among local governmental, non-profit and business organizations, the coalition hopes to expand and enhance the opportunities local residents have for electronic access to local community information and services. Currently, the coalition working groups are discussing needs and potential projects. These include the development of a local search engine (searching only regional web sites for information of citizen interest), development of a local community issues bulletin board, and development of guidelines and information for providing local residents with affordable internet access.

10. **Please answer the following questions about standardization of information technology:**

a. Please identify the extent to which information technology is standardized in Phoenix. Does it form a coherent architecture? (In responding to the question, consider, for example, the network environment, desktops, major software packages, and the server environment.)

Information technology is **greatly** standardized in Phoenix.   As mentioned in response to question 4a, Phoenix has in place the 10-Year Architecture Vision, Information Technology Policies, Standards and Procedures manual, Information Superhighway Policy, and City Manager Leadership. Information technology implementations must conform to the environment described by these documents.

Of pertinence to this particular question is the Information Technology Policies, Standards, and Guidelines manual that helps to ensure enterprise-wide standardization of common functionality. Standards are created for enterprise-wide information technology and not departmental solutions. A list of the manual's Table of Contents is provided below, and a copy of the standards manual is included as Attachment IT-G.

b.   How easily can individuals from different city agencies communicate with each other electronically?

As described in response to question 9, all Phoenix staff can communicate easily because of the PhoenixNet infrastructure described below. Phoenix's voice and data systems are fully-integrated. Phoenix has one enterprise e-mail system that is integrated with calendaring. Phoenix also has one enterprise network (PhoenixNet) to which all departments are connected via their Local Area Networks. Phoenix also has one phone system, complete with voice mail.

With the previously described policies and infrastructure in place, Phoenix can easily share data, eliminate redundant data, and take advantage of enterprise systems.

Phoenix uses LAN technology and workgroups to work on electronic documents. Files for reading are posted on web servers. Files that need to be distributed can be downloaded from the web servers or attached to e-mail messages.

In Phoenix, transparent electronic communication among Phoenix staff is so common that it is taken for granted.

c.   Is ownership and management of telecommunications centralized or decentralized to the agency level? To what extent are the management of telecommunications and data integrated? To what extent is a telecommunications architecture in place that permits city employees to communicate with each other?

Management and ownership of telecommunications are centralized from the enterprise perspective by ITD. Phoenix's 10-Year Architectural Vision lays out a design for centralized management of services that support the enterprise, and provides for departments to exercise authority and responsibility for internal efforts.

The effectiveness of a design for centralized management and ownership of the core infrastructure supporting voice, data, and video communications through implementation of a citywide Telecommunications Management Plan is strengthened by several ongoing telecommunications support processes:

- An annual IT Plan program actively ensures that departments use effective new technology solutions and that the solutions they choose are appropriate for use within Phoenix's business computing environment.

- Budgeting is done at the departmental level for their internal requirements.

- Departmental budget submissions requesting telecommunications items are reviewed by ITD to ensure that they meet standards, comply with open system concepts for future systems interoperability, and incorporate essential special considerations, such as Y2K compliance.

- New technology projects are combined at the enterprise-level when multiple departments need the same technology solutions.

ITD is responsible for coordinating the annual IT Plan update process conducted by each department. ITD supports this role by developing and maintaining:

- Voice, video, and data communications standards, policies, and procedures.

- The support infrastructure necessary to deliver quality telephone services to each location in which employees conduct Phoenix's business.

- Local and Wide Area Network (LAN and WAN) enterprise backbones that assure reliable delivery of each of the Phoenix business applications to authorized employees regardless of their physical work location.

- LAN and WAN infrastructure built on standards that provide complete interconnection between Phoenix's departments and their divisions. This ensures reliability in delivering business applications within a department and across the enterprise. A standard citywide data communications network also ensures citywide data sharing and exchange capabilities, and that new technology ventures, such as GIS, can be distributed to all required locations using a single technology.

- Data communications technical support expertise necessary to design, implement, and maintain a proactive program to ensure that Phoenix's LAN and WAN environment is expanded as necessary to always be capable of supporting improved ways of conducting Phoenix's business.

- Providing experienced project managers to departments as required to assist them in planning and managing the implementation of their internal technical programs.

Management of Enterprise telecommunications, data, and networking is centralized within ITD. This includes the design, maintenance, and support of PhoenixNet, the enterprise data communications network that has become the foundation upon which all present enterprise business applications and services are built.

As technology advances occur, the global role of the enterprise network is constantly being reassessed. Currently, the potential to use PhoenixNet to deliver voice (over IP) and video throughout Phoenix is being evaluated. The potential cost savings to be realized should Phoenix become its own telephone service carrier for local traffic is tremendous.

Individual departments can implement technology solutions that extend PhoenixNet to outlying sites. They must use Phoenix standard technology for network media, telecommunications support equipment including routers, switches, etc., as well as for the network operating systems and protocols supported. To this end, the department manages the WAN exclusive to its remote sites that exists to support the department's primary business mission. For example, the Water Services Department is managing a WAN that connects 11 remote Water Treatment and Delivery work sites.

PhoenixNet is recognized as a citywide resource. Therefore, it is centrally managed and monitored. ITD supports the infrastructure of the citywide network from the enterprise backbone to every desktop computer in Phoenix. This includes maintaining all wiring closets, network switches, hubs, routers, bridges, fiber optic repeaters, etc. By providing the infrastructure to every Phoenix location in a standard and open system interoperable fashion, project managers at the agency and Enterprise level can implement new systems or make system improvements independent of telecommunications considerations. ITD provides the same end-to-end infrastructure support to more than 150 remote sites occupied by Phoenix employees.

Careful consideration of PhoenixNet's increased use with each new business application and service has allowed ITD to increase its capabilities and capacity proactively, ensuring that it is always ready to support Phoenix's business needs. PhoenixNet was the single most important factor in the success experienced in implementing many new client/server ventures throughout Phoenix's many business locations. Before PhoenixNet, enterprise business applications required mainframe support using proprietary telecommunications solutions. PhoenixNet was designed to support virtually any open-systems compliant business solution at both enterprise and agency levels. Its non-proprietary nature and its presence throughout Phoenix has enabled rapid deployment of new business systems, such as the previously discussed single citywide electronic mail and calendaring system, SAP, PAYF, Inside Phoenix, Agency-to-Agency home pages, GIS, CHRIS, BRASS, TimeLink time and attendance system, and many others. In each case, the project was able to go forward without requiring a new data communications or telecommunications support system.

Between 1994 and 1999, PhoenixNet has evolved from a single ethernet network, to a WAN comprised of several ethernet networks, to a WAN with more than 150 ethernet subnets and switching for enterprise servers, to a fully redundant switched ATM network with ethernet subnets switched to every desktop. Extensive use of fiber optics provides the citywide network with 155 megabit bandwidth in all primary business locations. PhoenixNet's upward bandwidth growth potential is limited only by existing IEEE telecommunications and networking standards. Phoenix's enterprise network , PhoenixNet, is depicted in the following diagram:
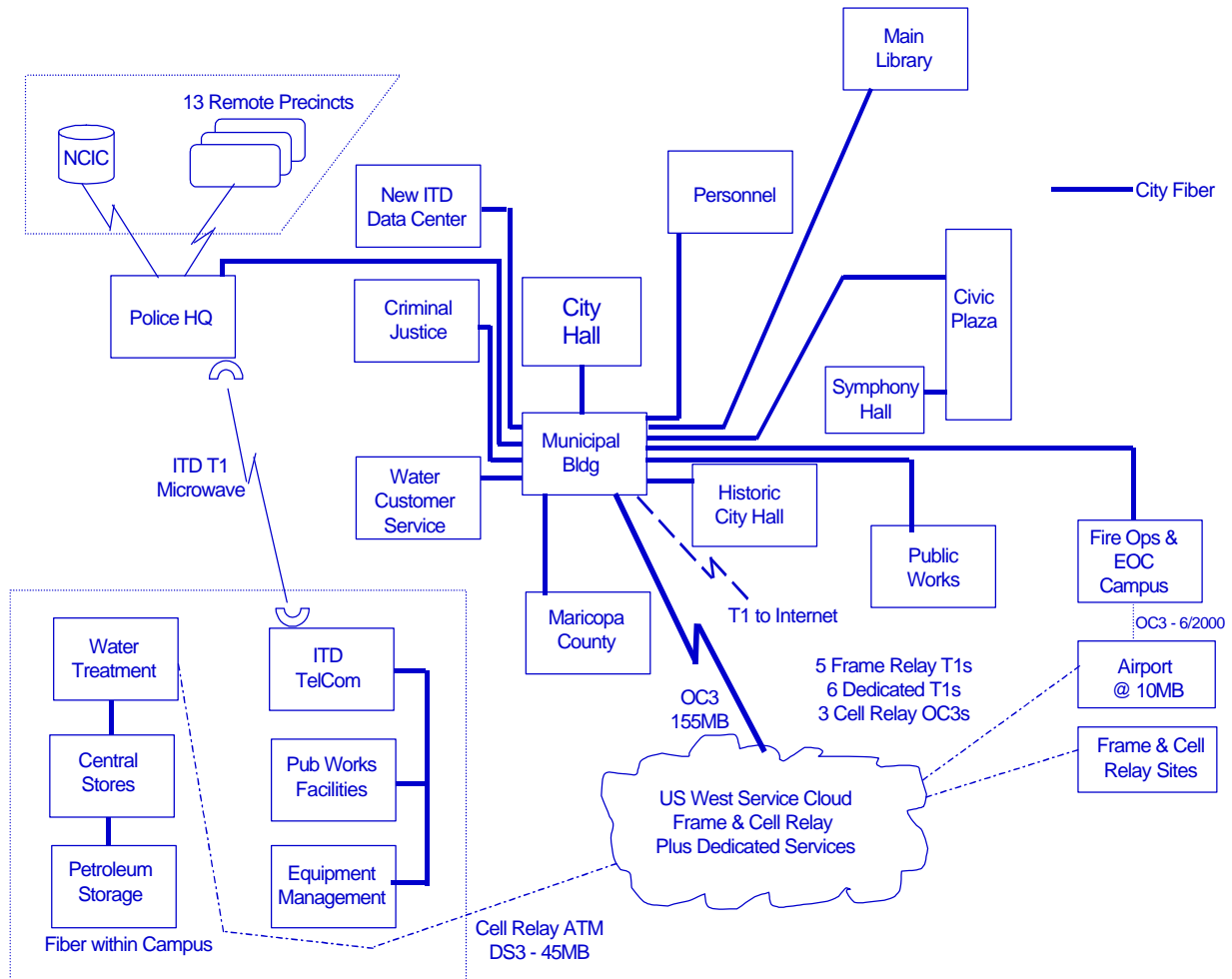
PhoenixNet's citywide implementation permits enterprise delivery of Intranet services to every Phoenix desktop computer location. Additionally, it provides a path by which departments can exchange information and work on cooperative projects. Every Phoenix employee can use PhoenixNet to exchange business-related electronic mail, and to send and receive electronic mail from the Internet. Subject to administrative control, every desktop computer can use the enterprise network to obtain browser, FTP, and Telnet access to the Internet.

Security is also an enterprise-level concern in this environment. Providing Internet access is easy. Limiting Phoenix's vulnerability to malicious damage from external sources via the Internet was the primary concern in developing Phoenix's Internet access methodology. Ultimately, segmenting Phoenix's trusted network environment from untrusted networks that host the services Phoenix provides to external users was determined to be the solution that entailed the least risk to Phoenix resources. The segmentation philosophy that isolates external users from Phoenix's internal resources was implemented with the aid of a state-of-the-art firewall system.

The following diagram details the philosophy of Phoenix's Internet security mechanisms:

Data paths are limited to prevent unauthorized access to City resources. Arrows indicate where communications can originate. If originated on the "DMZ," they are a form of Proxy session.

DMZ   DMZ

City Worker Access

Non-City Access

Cisco 2500

Firewall-1

Community Center
or Library

INTRANET

Trusted
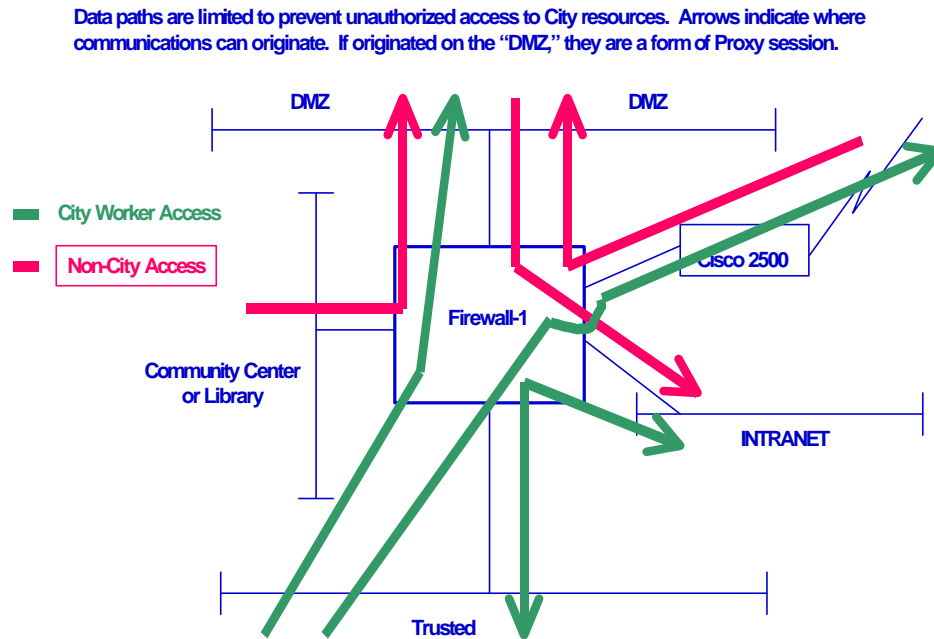
Phoenix's centrally managed telephone component of the telecommunications infrastructure not only provides employees with the ability to communicate directly, but the vast majority of employees now are supported with voice mail services. Finally, employees throughout Phoenix are supported with digital and alphanumeric pagers that can be accessed from their departments through Phoenix's telecommunications infrastructure.

As with PhoenixNet, the radio system and microwave backbone are recognized as enterprise resources and are centrally managed and maintained. The current radio system supports Police and Fire in their operational public safety roles, as well as all other departments in their respective public service roles. Phoenix maintains six main, mountaintop, transceiver sites and more than 50 remote receiver locations. Because Phoenix provides fire dispatch services for, and participates in automatic/mutual aid with, most of the cities and towns in the metropolitan area, the radio and microwave system provides communications for those external agencies as well.   The above communications sites are interconnected via microwave backbone and dedicated, leased, landline circuits. The microwave system is configured as a combination Optical Carrier, level 3, (OC-3, 155Mb/sec) Synchronous Optical Network (SONET) in a loop configuration for the northern portion of Phoenix, and as a redundant star topology in the southern portion.

The above radio system is being replaced with an open architecture, Project 25 Standards based, 800 MHz, digital, trunked radio system. This new system will become part of large radio network that will provide seamless radio communications for all cities and towns in the Phoenix and Mesa metropolitan areas. Full interoperability among Phoenix departments **and** all other cities and towns and their departments will be possible with this new system. The overall network will be composed of four main radio systems, networked to act as one. Users from any agency in any city will be able to roam seamlessly throughout the area, crossing system boundaries in a manner transparent to the user.

In late-November 1989, Phoenix implemented a citywide telecommunications system separate from the network of the local Regional Bell Operating Company. Since then, the system has grown to 14,174 ports providing various switched services including voice, modem and other call processing. The system supports integrated call centers for improved call handling and voice processing for voice messaging, automated attendant (menu-based applications) and voice announcement and broadcast capabilities. Handling almost 240,000 calls on a

typical business day, single system service with five-digit dialing is provided to about 320 City facilities scattered over 450 square miles. Supporting personnel include one overall system manager, one engineer, five aides and one supervisor performing customer database programming activities, and six specialists and one supervisor performing telephone installation activities. Maintenance and repairs are outsourced to the equipment manufacturer.

11. Please answer the following questions about training for end-users:

As a whole, Phoenix has a training and development policy that supports a system of employee development and training that produces and maintains an effective, motivated and productive work force capable of achieving the goals of the organization. Responsibility for an employee's development is shared by the employee, supervisors, managers, and the Personnel Department's Employee Development Division.

Additionally, training for end-users of new systems is customarily included in the implementation plan. For example, when SAP was implemented, all new end-users attended SAP classes. GIS and SSD conduct regular training. For those maintaining their own PhxWeb material, a customized one-on-one training approach is taken and takes into consideration the end-user's level of expertise and knowledge of computers. In other words, Phoenix tailors end-user training to fit the need and encourages cross-training.

For computer classes and end-user training, both City Clerk and ITD have dedicated computer training classrooms located in Phoenix buildings. With the click of a button, the ITD classroom computers can be customized to deliver the appropriate application training. For example, it might be GIS training one day with one PC configuration and SSD training the next with a completely different PC configuration.

Below are examples of training programs in Phoenix. Each example answers the series of questions 11a through 11d.

a. Please describe the nature of training programs offered to end-users regarding the use of information technology.

   (Please refer to the examples provided below. End-user training is customized to fit the need.)

b. How frequently are end-user training programs offered?

   (Please refer to the examples provided below. End-user training is provided on a continuous basis.)

c. What percentage of employees participate in end-user training programs each year?

   (Please refer to the examples provided below. Employees participate as required.)

d. Are there any minimum training requirements for end-users?

   (Please refer to the examples provided below. Minimum training requirements are addresed in project plans as a normal course of business.)

Personnel-Sponsored Computer Training
Personnel is responsible for coordinating Phoenix's training and development activities. This includes citywide end-user computer training for many of the common office automation products. Phoenix offers various levels of computer training at no cost to its employees. These training courses are conducted by qualified trainers from the City Clerk Department (Clerk) and/or by a contract training organization.

The training catalog is updated twice a year. Personnel and Clerk determine if the make-up of training courses offered should be changed. For the time period of January to June 1999, 28 different titled courses, totaling more than 140 classes, are offered to City employees. Additional classes are offered as dictated by demand. Employees must meet the stated course prerequisites before course attendance. Most employees

will not be able to attend software training until the software is installed on their computer. This will allow the employee to apply the learned skills in a timely fashion.

A copy of the Phoenix's course catalog, listing computer courses offered, is included as Attachment IT-F. Course offerings are also available on Inside Phoenix for staff access.

Geographic Information System Training

ITD is responsible for the administration of Phoenix's GIS. ITD provides end-user training on many of the business application uses of GIS as a normal course of business. The training programs offered include: Phoenix Maps On-line, Land Information Systems and ESRI's ArcView software, Liquor License Application system (LIS), Street Centerline Rectification, Spatial Analyst, Avenue software, Permit Internet Mapping System (for local utility companies), and Phoenix Education and Youth System (train-the-trainer approach for educators). Course schedules for GIS are available to Phoenix employees on Inside Phoenix and for utility companies on their agency-to-agency utilities on-line permit system home page.

Special class times can also be arranged to allow "just-in-time training" by contacting the GIS Training and Curriculum Coordinator.

The GIS training courses are well-attended. As an example, Phoenix has more than 400 PMO users and nearly 240 have attended the formal training in the last two years. When LIS had a major upgrade, all 500 users attended training in an eight-month period. Phoenix has more than 100 ArcView users, with more than 80 of them receiving training in the last year. Phoenix has two ArcView-authorized trainers, thus eliminating the need to spend money and time in sending staff to out-of-state training. Finally, Phoenix is preparing to train 400-500 private utility company employees on the use of the web-based PIMS available on the agency-to-agency home page referenced above.

The end user must ensure a minimum hardware configuration and the procurement of software before training. The end users will not receive access to the system until he/she completes the proper training courses.

Department Sponsored/Other Training

Departments share responsibility to provide training opportunities to its employees. Departments, at their discretion, may spend their appropriated training dollars on end-user training programs. The type of training is usually department specific for courses not supported by Personnel (e.g., Microsoft Project).

As a benefit to employees, Personnel manages the Employee Development Reimbursement Program. The program offers employees reimbursement of approved educational expenses. The benefits include tuition, seminar/workshop and professional membership reimbursement. Employees have the opportunity to use this program to fund computer training not offered by Personnel.

When Phoenix implements new systems, extensive training is offered to end-users to ensure a successful implementation. When Phoenix implemented SAP in July 1998, extensive training was offered to end-users based on their user profile. Training rooms were developed and consultants were acquired to create all training materials. City staff provided the training to the end-users in a "referenced-based training" environment. All training was offered "just in time" during the last two months before implementation. Students were allowed to practice dummy transactions in a training environment back at their work sites before "going live."

During the initial phase of SAP training, Phoenix offered 34 training courses, equating to 354 classes. A total of 3,088 registrations were received from the 830 employees who attended training. This equated to almost four classes for each student. Students were required to take certain courses before accessing the system. Advanced classes had prerequisites before attendance. The training documentation, business processes and quick reference guides were placed on Inside Phoenix for end-users to refer to after receiving the formal training. On-line documentation is updated as necessary to provide users with real-time training updates. Training courses are still being provided as new users are added.

PhxWeb End-User Training
While the City Clerk Department provides training to Phoenix staff on the use of the Internet and Intranet and browsers, the PhxWeb team in ITD is responsible for training staff on the maintenance of the material posted on Phoenix's Internet and Intranet. Staff maintaining material on PhxWeb servers have varying levels of computer expertise that encompasses the whole range from novice to expert. Therefore, customized one-on-one training is provided by ITD at the end users workstation. In this respect, PhxWeb can ensure that the end user has the correct tools and computer option settings. The end user is also more comfortable with their own desktop environment. PhxWeb staff also requests that the training session include a couple of back-up staff members to accommodate for program continuity in the event of absences or staff turnover.

PhxWeb also handles the training for SSD liaisons. When SSD was implemented, classes were conducted for primary and alternate SSD liaisons. SSD liaisons are expected to pass on the training and knowledge to their alternates and ensure other staff members are cross-trained. Because the entire application is web-based (point and click), formal classes are not required. When new maintenance function is rolled out, usually an e-mail message to the liaisons describing the function and the location of the link is all that is required because of the web-based technology.

PAYF "Computer Buddies" Training
One of the facets of PAYF is the senior outreach program. The Human Services Department embarked on training an initial set of senior citizen volunteer "ComputerNet" trainers. A local training company, Midak, donated its training facilities and staff to train ComputerNet trainers in the use of PAYF. Once the ComputerNet trainers were in place, they, in turn, conducted one-on-one training for senior volunteer "Computer Buddies." The Computer Buddies are available on-site to help clientele on a one-on-one basis learn how to use PAYF via the public-access workstations. The Computer Buddies exceeded their goal to contribute 19,975 volunteer hours by almost 5,000 hours.

12. **Please answer the following questions about training for information technology specialists:**

   a. Please describe the nature of training programs offered to information technology specialists regarding the management, operation, or maintenance of information technology.

   Phoenix departments and functions have a shared responsibility with employees and supervisors to provide an adequate training program for employees. This includes adequately budgeting and managing specific departmental funds for a training program. ITD, like all departments, must plan for and request training funds during the normal budget process. These funds are then programmed for use by technology staff. ITD management ensures that funds are used to support current operations while keeping an eye toward the future by training staff in new technologies. ITD's current fiscal year's training plan identifies scope and frequency of training attended and is included as Attachment IT-AB.

   Phoenix uses alternative sources of funds as appropriate. The OA/IS bond funds were used to train all Phoenix LAN administrators in NetWare 5.0. The funds were used to ensure the same level of proficiency throughout Phoenix. Phoenix embeds system administration, database management, application support and network management training in hardware and software procurement. This allows staff to obtain current training on products procured without impacting the current year's training budget that is necessary to maintain skills. Phoenix also adds training language in its master software license agreements to have the vendor provide annual training credits for Phoenix staff to ensure currency in skills. Phoenix also uses reference material funding to procure Computer-Based Training (CBT) programs. These programs offer employees a self-paced atmosphere that can be monitored by supervisors. Examples of CBT courses are: Oracle, C programming, Web development (Java/HTML), and UNIX administration.

   b. How frequently are training programs for information technology specialists offered?

   In Phoenix, training is continuous for its information technology specialists. Training is offered throughout the year to ensure adequate coverage in managing Phoenix's information technology environment. Each

department must properly staff their operations in order to meet processing and support demands. In some cases, it is less expensive to make arrangements for an instructor to travel to Phoenix to conduct training than send several staff members out of state for the training. As new technologies are procured, key staff are sent to training to become proficient with the new product(s). Keeping the technical staff trained is one of the highest priorities of ITD.

c. What percentage of information technology specialists participate in training programs each year?

Based on ITD's data, approximately 60 percent of all the technology specialists will attend training in fiscal year 1998-1999.

d. Are there any minimum training requirements for information technology specialists?

Yes, every information technology specialist classification has associated minimum training requirements. These requirements must be met before hiring or promotion. All Phoenix job specifications are provided on the web at www.ci.phoenix.az.us/JOBSPECS/jobsidx.html. More specific training requirements relative to the particular position may be included in the employee's performance review goals section.

ITD leverages its existing workforce in three highly specialized technical areas that are typically difficult to attract and retain staff: database administration, UNIX system administration, and SAP administration. Interested employees are placed in trainee positions with a structured training program developed for that specific technology discipline. In the database administration area, one employee has completed the program and has been promoted to senior level status, with two additional employees currently in the program. Trainee positions were also created and filled in the UNIX, Network, and SAP environments.

Staff in the trainee positions receive classroom, on-the-job and computer-based training. This approach ensures control on the type of training the employee is receiving while offering a self-paced environment for the "hands-on" portion of the training. Courses are specific and are monitored by supervisory staff to ensure progress is being made in becoming proficient with the technology.

13. Will Phoenix be able to successfully address Year 2000 compliance? Where are Phoenix's main trouble spots? What is being done to address these concerns? What plans for compliance exist? How is oversight and validation conducted? What is the status of validation?

Yes, Phoenix is successfully addressing Year 2000 compliance. Since 1994, when the City Council approved the Y2K Remedial Action Program prepared by ITD, Phoenix has been diligently working to ensure Y2K readiness when the century rollover takes place. In an organization as diverse and large as Phoenix, the biggest challenge in addressing Y2K is keeping several simultaneous threads of activity going while ensuring a high level of coordination to minimize duplication of effort.

Decentralized Approach
Phoenix has implemented a decentralized approach in which individual departments are responsible for identifying and correcting their own Y2K issues as well as developing contingency plans to ensure minimal disruption to services should something fail to function properly after the century rollover.

In accordance with City Manager's Letter 1171 issued in April 1995, all City departments were requested to prepare and implement a Year 2000 Rollover Plan to address and minimize Year 2000 problems. A suggested outline for a Year 2000 Rollover Plan was included to assist departments in the preparation of their individual plans. All department plans were submitted to ITD for review and since that time, departments have been required to include updates to their plans along with funding requests in their annual Technology Plans.

This approach puts staff with the most experience in the delivery of unique city services in charge of addressing the vast array of Y2K issues facing Phoenix. At the same time, it spreads the effort across a number of individuals allowing many more activities to take place at any given time.

Independent Verification Of Progress

In order to verify the adequacy of Y2K efforts throughout Phoenix, the City Auditor Department contracted with an outside auditing firm to conduct an independent assessment of all departments' Y2K plans and progress in three phases throughout 1999. The first Y2K review took place during the months of February and March 1999. The purpose of the Y2K reviews was to evaluate each department's Y2K project management, system inventory, testing and contingency plans and highlight any high-risk areas requiring more focus or attention in the months remaining before 2000. All departments were included in this phase. Departmental plans, status reports, budgets, inventories, risk assessments, task schedules, documentation, vendor inventories, vendor compliance letters and non-responsive vendor lists were reviewed. In addition, key staff was interviewed. Findings and recommendations were documented in final reports, which were sent to Phoenix Auditor, City Manager, the Deputy City Manager responsible for each department and the Department Director. Departments were asked to respond to the recommendations and indicate an action plan with target dates for completion. An example of a Year 2000 Status Review final report is provided in Attachment IT-AC.

Phase 2 will take place during May 1999 and will consist of a review of 12 key departments (Police, Fire, Water, Public Works, ITD, Aviation, Street Transportation, Municipal Court, Finance, Public Transit, Retirement, Civic Plaza) identified during Phase 1. These departments were selected based on the nature of the citizen services provided, public safety issues, criticality to citywide operations, or significant fiscal implication. The focus of this phase will be to ensure adequate progress has been achieved to date. The third and final phase is planned for July/August and will likely consist of the same scope and focus.

Centralized Coordination And Reporting

In addition to the decentralized aspects of Phoenix's Y2K effort, ITD has overall responsibility for coordinating and tracking progress all Y2K efforts citywide. In 1995, ITD launched a citywide program of Y2K awareness, training, communication and department assistance. Several speakers were invited to present Y2K issues to initiate department staff in the program. In addition, ITD disseminated information and was available to departments to assist in their planning efforts.

The Information Technology began publishing Phoenix's Year 2000 Status by Departments in April 1998. (See Attachment IT-AD) The purpose of this document is to provide a monthly update to management on the status of the Citywide Year 2000 correction program as reported by all departments.

In January 1999, Phoenix enhanced the status reporting requirements of the department to include milestones in bullet-point format for each identified essential system. A major objective of this enhancement is to document and clarify the processes used and steps taken to verify compliance, steps begun or completed to correct non-ready systems, and issues that may delay Y2K progress. (See example in Attachment IT-AE)

In order to make status reporting and updating as easy as possible on the departments, an on-line method was developed using document templates and e-mail. City departments are only required to report changes in status or indicate that no changes are necessary each month. Status updates are sent to a central electronic mailbox, which is regularly monitored by several Y2K team members.

In January 1999, ITD stepped up central coordination efforts for the final year countdown. A top down review of all essential systems identified by the departments was performed as a crosscheck to ensure all critical systems and the infrastructure components that support them were being addressed for Y2K readiness. Special care was taken to ensure that essential systems were consistently identified and inventoried and that there were no gaps or significant overlaps in the efforts to correct remaining Y2K issues.

From this effort, a citywide master list of all essential systems was created and reviewed by all departments. Departments agreed on the individual who has primary responsibility for final Y2K readiness of all systems that are shared by multiple departments. Primary responsibility was also assigned for coordination with external organizations and service providers such as the utility companies, media, emergency response agencies, key vendors, banks, etc.

A number of committees have been formed to further coordinate special areas of Y2K such as: Media Contacts, Public Safety Issues, Contingency Planning, Citizen Awareness, Emergency Exercise Planning. Several of these committees are discussed in further detail in following sections.

Information Sharing And Communication

Several techniques are used to enhance good information sharing and communications on this critical project. First, ITD holds a citywide Y2K coordination meetings monthly with all departments/functions. A senior manager and technical person involved in Y2K efforts in each department/function are in attendance. These meetings serve as a primary means of communicating a broad range of issues. Departments are encouraged to share experiences, issues and advice. Frequently, the group collectively makes decisions on how to remove obstacles and resolve issues. In addition, experts are invited to present Y2K-related materials ranging from technology alternatives to legal implications.

Inside Phoenix also serves as a primary means of sharing information and communicating. Everything from standards, definitions, inventories, status reports, reference documents, vendor Y2K website links, forms, correspondence and procedures are posted. Departments also have the option of maintaining department-specific material for coordinating within their organizational unit.
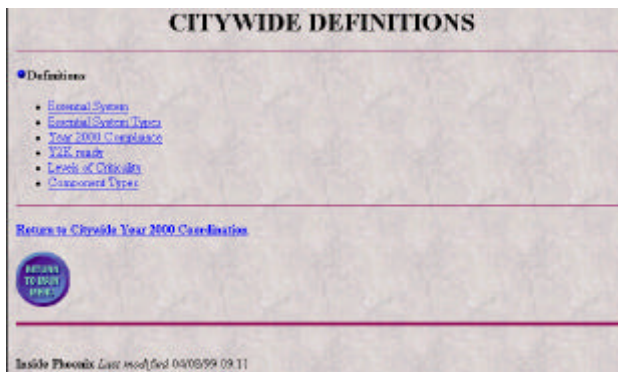
A critical factor in coordinating citywide activities was the establishment of common definitions. Working as a team and seeking legal review, the Y2K project managers throughout Phoenix have reach a common understanding of what "Y2K ready," "Essential System," "Risk Factors," and many other key terms mean.

Automated procedures are used as often as possible to streamline communications. One such example was already discussed - the use of forms and e-mail to report status updates.

E-mail serves as a primary means of communicating quickly and efficiently with project teams and committees.

Public Awareness

A significant concern about the Year 2000 is keeping the public informed to reduce the risk of panic, fraudulent activities and unnecessary fear and concern. Unfortunately, many "experts" are working in the opposite direction. In response, Phoenix has pulled together a comprehensive Y2K citizen awareness program.

The first public documentation on Phoenix's Y2K status was posted on PAYF in December 1998. Phoenix's Year 2000 Status by Departments became the official Y2K Readiness Disclosure Statement for Phoenix. As additional information is developed internally for city coordination, much of it is being made accessible to citizen for review. In addition, the highly visible departments were asked to prepare Frequently Asked Questions.
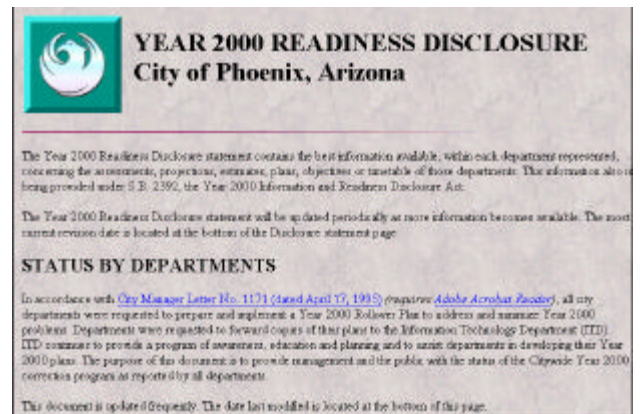
Special attention has also been given to informing citizens on broader Y2K issues such as personal preparedness and fraudulent schemes. Links to informative sites are regularly added. The information can be found at www.ci.phoenix.az.us/Y2K on the Internet or at more than 50 public computer workstations located in libraries, community centers and other facilities throughout Phoenix for those who do not have access from home. Information is regularly updated, and ITD maintains a documentation trail of all changes in the event of future legal actions.

In addition to information posted on the web, electronic and hardcopy information packets are being prepared for citizen inquiries. The Public Information Office is centrally handling all citizen inquiries on behalf of the departments and elected officials. A citizen Y2K hotline and e-mailbox have been established to make citizen contact easy.

Phoenix is also making use of all media outlets it has access to including NOTES, the water bill newsletter insert and City Connection, a weekly publication for the employees of Phoenix. All Y2K presentations to the Council Transportation and Technology Subcommittee are being taped by the Phoenix Channel 11, Phoenix's cable channel, and re-run at many different times and days. The first of such presentations took place on February 22, 1999, and consisted of a Citywide overview of the approach underway and the current status, Emergency Operations Center preparations for drill, the Red Cross' educational activities in the community, and Police and Fire Y2K preparations. The second presentation is scheduled for May 12, 1999 and will include presentations of the Y2K status of the following departments: Public Information Office, Aviation, Public Works and Water Services. In addition, representatives from the major local utility companies also will present. Other programming on Phoenix Channel 11 includes staff interviews, Public Service Announcement and special stories.

To ensure media contacts are quickly responded to and given the most up-to-date and accurate information, a team of Public Information Officers has been established with representatives from the highly visible departments. Information Technology, the Public Information Office and the Law Department are working closely with these individuals to ensure consistency and accuracy in the Y2K messages and information delivered. All media contacts are documented and tracked.

Finally, special attention is being paid to the most vulnerable segment of the population - senior citizens. A "train-the-trainer" type event has been scheduled for June 23, 1999. Senior citizen volunteers who are active in the senior centers throughout Phoenix will be trained on Y2K issues so they can return their centers and inform other seniors. Presentation materials will be distributed to each volunteer for his or her use in future presentations as well as certificates and T-shirts. The volunteers will hear Y2K facts firsthand from knowledgeable speakers in the areas of fraud, banking, city services, utilities, and medical services. Speaker from Phoenix's Police and Fire departments, city Y2K coordination program, the State Attorney General's Elder Affairs program office, local utility companies, the Red Cross and the FDIC have been confirmed. This event also will be taped for showings on the Phoenix cable channel. To ensure the content of the program addresses senior concerns, focus groups will be conducted at several senior centers before the event.

Contingency Planning Coordination
As discussed earlier, each department is responsible for developing a detailed contingency plan for uninterrupted service delivery. Because of the critical nature of Y2K contingency planning and interdepartmental coordination, a centralized function has been established to focus on contingency planning coordination. A team with representation from citywide Y2K coordination, Emergency Operations Center and led by a staff person from the City Manager's office has been established to coordinate with all departments to ensure a seamless contingency plan for the millennium rollover. Contingency planning coordination will focus on identifying the interfaces and integration necessary across the individual department plans to ensure consistency in approach.

Preliminary contingency plans will be tested during a Y2K Emergency Exercise scheduled in July 1999. Details of this drill are discussed in the following section. Based on the results and findings of the drill, departments will have until August 31, 1999, to finalize and submit their Contingency Plans to Phoenix management. In addition, all departments are required to prepare a presentation describing their specific contingency plans in the September/October timeframe to the City Manger, Y2K Coordination team, and the Contingency Plan Coordination team.

Departments are expected to provide staff for the New Year's Eve holiday and following weekend who will be available to resolve any Y2K issues before business resumes the following Monday. To assist with this effort, Citywide Y2K Coordination team is preparing a weekend checklist, which will detail the tests and verifications that should be performed on all systems, facilities, infrastructure and communications equipment once the rollover has taken place. A 24-hour technical Y2K helpdesk will be operating to track and assist departments with any problems discovered during this process.

In addition, departments involved in public safety, emergency response, and the supporting infrastructures have established a working committee to identify and address critical contingency areas of shared responsibility. Specifically, issues such as: fuel availability and delivery, back up communications infrastructures, locations of generators for backup power, emergency access routes, public event support, citizen backup communications, public awareness and safety tips are being planned well in advance of New Year's Eve. The Emergency Operation Center will be open and operational on December 31, 1999, and on standby for other critical dates such as September 9, 1999.

Y2K Emergency Exercise
Beginning at 5 p.m. on Friday, July 9, Phoenix will be hosting and coordinating an 15-hour regional Y2K Contingency Response Exercise. This overnight citywide exercise will test Phoenix's ability to deal with a number of simulated problems caused by the Y2K millennium bug.

All departments and functions will have staff participating in the Emergency Operation Center during the exercise. A team of 92 individuals representing every City department and more than a dozen outside agencies (including the Red Cross, local utility companies, Greater Phoenix Chamber of Commerce, Salvation Army, County/State emergency management offices and US West), has been working since last December to develop the specifics of the June exercise.

The purpose of the exercise is threefold. First, it will test and verify Phoenix's internal Y2K readiness efforts. Second, the exercise will test the various department and Citywide contingency plans. Lessons learned during the drill will allow Phoenix to take corrective action and develop and fine-tune the contingency plans between June and December. Finally, it will provide valuable information to departments in their effort to determine how to staff on December 31, 1999 and January 1, 2000.

Phoenix's Agency-to-Agency website at http://www.ci.phoenix.az.us/phxeoc.html is used to coordinate communications among city staff and external agency during the planning phases of the drill.

Working With Other Organizations
In addition to the coordination with external agencies taking place in Emergency Operations, Phoenix works with several other organizations to share information, approaches and findings. In 1995, Phoenix founded the AZ Millennium Group, a community-wide, information-sharing organization. City staff co-chairs the monthly meetings, which
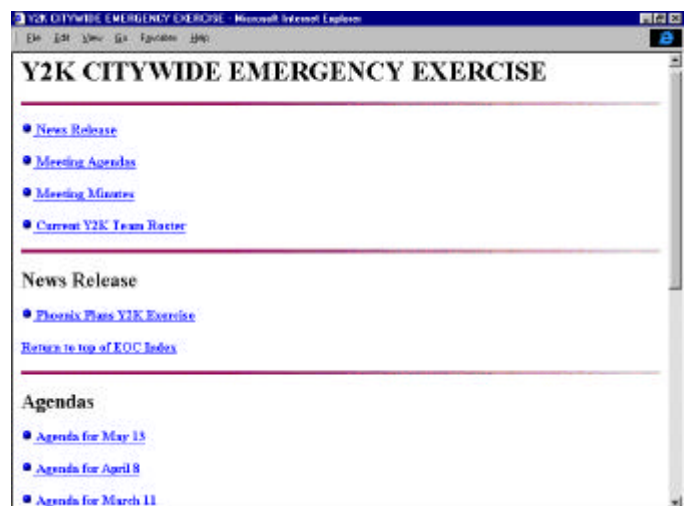
include representation from many local governments and corporate organizations. Typical meeting agendas include expert speakers or member organizations whom present various corrective action programs and share information about Y2K.

Phoenix also actively participates in a Y2K committee in the Maricopa Association of Governments.

14. **Does Phoenix have a Geographic Information System (GIS)? If so, please describe how it helps Phoenix. Also, what efforts has Phoenix made to coordinate the separate GIS' of individual agencies?**
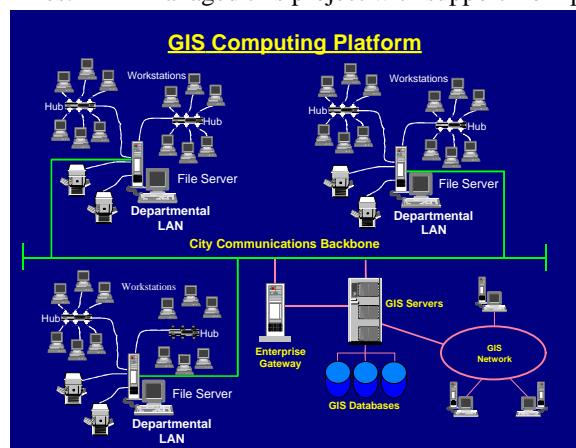
Yes, Phoenix has a very mature and complex GIS. Spatial and data management and applications is a key goal in providing the single, fully-integrated system for all geo-based programs to use. The City's robust GIS provides benefits to more than half of the departments and functions, supports more than 1,000 customers, maintains 111 enterprise-wide geographic layers and associated information, and 45 applications. The following attachments have been included to illustrate the volume and complexity of the City's GIS program.

- GIS Applications Summary, Attachment IT-AF
- Enterprise-wide data layers, Attachment IT-AG
- Current Uses of GIS by department, Attachment IT-AH
- GIS Overview Diagram, Attachment IT-AI
- Mapping Workload Statistics, Attachment IT-AJ

The GIS project began in the late 1980's to create a Citywide GIS infrastructure to manage geo-spatial data for use by all Phoenix departments. Phoenix's GIS program was one of five technology projects approved by citizen election under the OA/IS bond fund. Once funding was secured, a project manager was hired to organize, coordinate, and provide vision for the project. An outside firm was hired to study map usage and maintenance within Phoenix and provide recommended conversion approaches. Interviews were conducted with departments to determine current map customers, types and purposes of current maps, current maintenance processes, and what maps were the most commonly used.
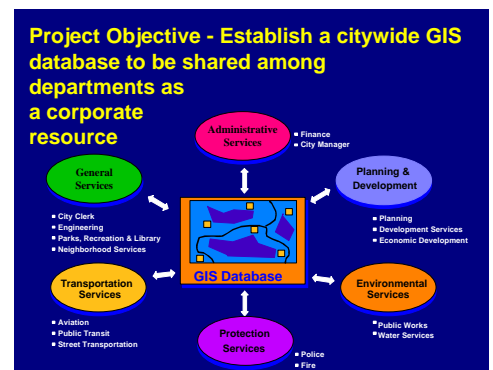
Based on the study findings, a major seven-year conversion effort was undertaken to convert the most commonly used maps to digital format for our large city of more than 440 square miles. ITD managed this project with support from primary departments responsible for map creation and maintenance. A GIS Steering Committee was formed to oversee and provide direction to the project. This Steering Committee was composed of a cross-departmental team of managers with vested and/or general interest in the GIS initiative. ITD then hired a team of GIS programmers, selected departmental conversion teams, a conversion vendor to provide map conversion services, before work began.

To ensure day-to-day business would continue during conversion, departments such as Engineering and Architectural Services, Water Services, Planning and City Clerk accepted additional responsibilities. Departments were required to maintain existing maps to support Phoenix business, prepare materials for a conversion vendor, perform quality assurance and quality control testing, and then maintain map information electronically for accepted quarter sections. ITD staff developed automated quality assurance and quality control (QA/QC) procedures to check delivered data, and staff also created maintenance applications allowing departments to maintain digital maps once they were received. Departmental staff were trained and conversion

was underway. As a result of efforts from each primary department, Phoenix is enjoying the benefits of digital maps today.

GIS provides an enterprise hardware and software infrastructure for managing location-based information commonly used by City departments. ITD works closely with various departments to ensure the quality of data is maintained for the benefit of Phoenix. Departments such as Engineering and Architectural Services, Water Services, and Planning maintain core map layers while other departments add layers more specific to their businesses. All new layers are constructed on a common foundation (i.e., survey points, monument lines and parcel boundaries) to ensure accuracy and usability. These map layers are then stored in a central repository for use by all departments. Phoenix's corporate map creation and data clearinghouse approach reduces the need for duplicate maintenance, eliminates departmental silos of data, facilitates data sharing, and provides data for additional research and business functionality benefiting all departments.

GIS data and tools are made available at customer desktops to take advantage of the infrastructure. GIS uses Inside Phoenix to disseminate information to departments, including product information, training class offerings, newsletters, and technical support for LAN Administrator and Developer. Via Inside Phoenix, a searchable GIS metadata catalog is available to aid customers in identifying what layers are available and whether they will meet their project needs. This catalog was developed using the national metadata standards, allowing for information sharing with other agencies. Data formats include enterprise map libraries that can be accessed via our gateway and the Spatial Database Engine residing over an Oracle RDBMS. Using the latest data storage technology (i.e., ESRI's Spatial Database Engine), digital map data is easily available to traditional business system development tools allowing for embedded map functionality and increased performance across the organization.

Enterprise standards have been created to allow customers the freedom to use standard tools and development methods to support their business needs. Standard tools used at Phoenix include ARC/INFO, ArcView with extensions, and Map Objects (Business and Intranet/Internet). These tools provide various approaches such as custom robust mapping maintenance and analysis applications, ad-hoc analysis and map creation, and embedded mapping functionality within existing business applications. Customers with in-house GIS staff may combine their current/historical business system data, standard GIS tools, and the current infrastructure to service their departmental request(s). Customers needing assistance may request services from ITD staff possessing GIS expertise or hire vendors from a qualified vendor list to perform the necessary services. This decentralized approach fosters departmental initiative to deliver services in a timely manner while maintaining a common infrastructure for information sharing.

Besides enterprise standards, several additional initiatives have been tackled to create awareness and interest, aid communication, procure technology tools and support, provide training, and aid planning and development efforts of departments. Examples include:

- GIS quarterly newsletter - Highlight departmental and enterprise GIS development activities, provide technical articles for developers, provide vision for managers, announce upcoming events (e.g., training, conferences, seminars, etc), and promote general awareness. (Attachment IT-AK)

- ArcView and Phoenix Maps On-line (PMO) User Groups - Developed to allow staff to share information, provide input, and network with other GIS professionals.

- Enterprise Master Purchasing Agreement - Created to aid departments in acquiring GIS hardware, software, and professional services in a cost-effective and timely manner.

- City's annual ITD Qualified Vendor List - Provides a pool of authorized companies where departments can acquire professional services. This list streamlines the procurement process and accelerates development efforts.

- ITD GIS Training Program - ITD has a robust training program for enterprise applications and authorized trainers that provide regular in-house ArcView training classes.

- Enterprise Team of GIS professionals - ITD has a team of professionals who are available to assist departments with all stages of planning, development, implementation, and support.

Phoenix's enterprise professional staff provide technical support to ensure that the latest versions of standard and upgraded GIS software are compatible with existing, custom GIS applications. With centralized control of core GIS software, Phoenix can maintain the exchange of data and applications among departments and pool software licenses to share enterprise-wide, thus providing GIS capabilities to smaller City departments or those without funds to purchase GIS software on their own.

Corporate repositories exist to store standards and re-usable GIS application code to be shared with all City departments. This encourages a decentralized approach to application development as other City departments have access to tools and guidelines allowing them to create GIS applications on their own. Phoenix benefits by reducing the rework of applications, standardizing applications, and rapid deployment of GIS into City departments as they are given the autonomy to take advantage of GIS technology within their own business areas. Our approach of providing the data, tools and knowledge to the departments at their desktops is allowing GIS to become another standard tool in supporting day-to-day decisions.

Below is a list of additional benefits Phoenix's GIS program provides to departments, citizens, businesses, and external agencies that have not been mentioned in describing the program:

1. Assists public counter staff in providing services:

   - Development Services staff can visually locate properties with customers providing more accurate business system information.

   - Engineering can provide digital quality paper map products to customers immediately.

   - Current zoning, property dimensions, easements, rights of way, estimated setback and more can be reviewed with customers.

   - Project Engineering staff can capture project boundaries electronically with customers.

   - Customers can purchase electronic data reducing planning and development costs.

   - Development Services can accept and process digital plan submissions reducing turnaround times.

2. Quality of map products has been improved dramatically. Staff no longer have to rely on Mylar maps or paper maps that may be up to one year old. Readability of maps is improved because of standard drafting techniques, symbols, descriptions, and precision of line widths produced by digital maps.

3. Aids the Planning Department with long-range planning for Phoenix's General Plan.

4. Allows departments to visualize their business data and identify problem areas not easily accomplished without GIS technology including:

   - Community and Economic Development Department's analysis of potential business sites to encourage business.

   - Water Services Department's Water Master Planning efforts.

   - Police Department's crime solving efforts and sex offender neighborhood notification.

   - Street Transportation Department's accident location analysis.

   - Aviation Department's flight tracking and noise regulation enforcement, abatement, and planning.

   - LAN management efforts.

5. Fire and Police computer-aided dispatch systems rely heavily on GIS, using global positioning systems for locating and dispatching emergency response vehicles.

6. Facilitates public notification by mail to owners and/or residents.

7. Maps aid City Council in reviewing liquor license applications.

8. Provides functionality to departments not previously available without GIS:

- Automated network analysis for vehicle routing applications.
- Allows for ties between facilities management maps and traditional facilities management business systems.
- Ability to embed mapping functionality within traditional business systems (possibilities are limitless).
- Ability to perform ad-hoc analysis and create custom map has been significantly assisted. Before GIS, such efforts may have been cost prohibitive.
- On-line, real-time maps are available to internal staff and external customers to aid with service delivery.

9. Digital data can now be purchased in small or large quantities.

The next phase of Phoenix's GIS program is to further integrate the technology in day-to-day business to assist with business decisions and service delivery. This will be achieved by continually improving the technical infrastructure and quality of data, adding new digital layers, assisting departments with GIS-centric applications, expanding map capabilities on the Intranet, embedding GIS into additional existing departmental and enterprise business systems, and expanding from an enterprise GIS to a societal GIS by map-enabling PAYF, and providing awareness for the community at large through various forms of education.

In addition to supporting enterprise needs, Phoenix participates in GIS activities in the greater Phoenix area and in the GIS community as a whole. Phoenix is involved in activities with agencies such as Arizona State University (ASU), Maricopa County, the Maricopa Association of Governments, Pima County, the State of Arizona, US Census, the Salt River Project, Arizona Public Service, and Phoenix school districts. City staff also participate in professional organizations and GIS events sponsored by the Arizona Geographic Information Council, the Urban and Regional Information System Association, the American Association of Geographers, and attend and write papers for GIS/LIS and ESRI user group meetings. Working relationships with neighboring cities, such as Scottsdale, Paradise Valley, Tempe, and Mesa also provide forums for discussion and sharing of GIS information.

Phoenix's interaction with these different agencies varies from the sharing of data and GIS application code to participating in presentations, meetings and discussions. Phoenix has shared its GIS databases at no cost with ASU, Maricopa County, and the State of Arizona. An example of Phoenix's participation in outside agencies is the creation of a Memorandum of Understanding (MOU) with Maricopa County to regularly receive updates of County Assessor information to augment Phoenix's Land Information System. To assist Maricopa County's efforts to improve their GIS, Phoenix has given the County all digital parcel information and has worked on a standard format for future data layers to make data sharing between the County and Phoenix easier. Phoenix is also building a Countywide, highly accurate, geocoded street centerline in GIS format to improve 911 services in the Phoenix metro-area. When completed, this data also will be shared with outside agencies.

Another example of Phoenix's participation in the coordination of GIS activities in outside agencies and in the community is the creation of the "AuThenTiCity" curriculum for schools in the Phoenix area. This program, developed in coordination with ESRI and AT&T, makes GIS tools and City of Phoenix data available to schools to familiarize high school students with GIS concepts. Students are trained in ArcView using a series of tutorials and lab exercises, developed by Phoenix staff. Through this partnership, students in Phoenix learn more about their communities and are introduced to GIS technology.

Phoenix's GIS has received much attention and acclaim. ESRI presented Phoenix the "Special Achievement in GIS" award at its 18th annual user conference in July 1998 for exhibiting technologically advanced and innovative approaches for the use of GIS.

A copy of a GIS presentation that outlines the original project goals, timeline, evolution and future direction is included as Attachment IT-AL.

15. Is there anything else you think we should know about your information technology system? (For example, does Phoenix face any unusual challenges in the area of information technology?)

With the infrastructure in place, commitment to keep abreast of new technologies, and a clear Architecture Vision for a guide, no "unusual" challenges are in the forecast.

16. Has Phoenix developed any unique or innovative approaches to information management? (For example, can you give examples of how information technology has supported key decisions or improved service delivery?)

Phoenix is and continues to be visionary in its approach to information technology. In October 1998, City Manager Frank Fairbanks received Public Technology Inc.'s Technology Leadership Award for advancing the development and use of technology in Phoenix, presented at the International City/County Management Association's 84th annual conference.

An example of the recognition that Phoenix receives for its innovative approaches to information technology management was the invitation of the Department of Commerce for Phoenix to exhibit Phoenix At Your Fingertips at the October, 1998 United Nations International Telecommunications Union Plenipotentiary Conference in Minneapolis. The Conference was attended by hundreds of international dignitaries representing numerous countries from around the world. The Department of Commerce extended the invitation to only 9 of the most highly-regarded projects out of all those they have helped to fund.

Because of the recognition received for successful systems, Phoenix is frequently visited by other government agencies and private industry to gain insight into the technical environment. Through the City Manager's vision of "seamless service" and the "coordinated decentralized" approach to information technology management, departmental barriers and control issues have all but faded away. For example, visitors are astonished that Phoenix has been able to consolidate all services into one electronic service (PAYF) that is organized by topic and not departmental organization. Phoenix focuses on customer service and service delivery.

Phoenix's reputation also draws vendors and system developers who are eager to use Phoenix as a beta site or partner.   Just within the last few years, Phoenix has been involved with:

- SAP - Phoenix was the first government entity in the United States for implementation.
- Municipal Reference Model Program - Phoenix was the first organization in the United States to pilot Canada's Chartwell Inc.'s program to define requirements for a multi-departmental environmental data management systems emphasizing hazardous materials on city-owned facilities.
- HahtSite web interface development software - Phoenix beta tested and standardized on this product for web application development.
- Oracle - Phoenix was the beta site for Oracle Reports for the Unix environment.
- ParcPlace's SmallTalk object-oriented web interface development software - Phoenix partnered in a venture with ParcPlace for the Valleywide Electronic Community Calendar.

Another unique approach employed by Phoenix is the Resource Center. In 1995, an Information Technology Resource Center was created in ITD. The Resource Center is a pool of Information Technology (IT) professionals who possess a wide range of business, technical and analytical skills, and experience who are not permanently assigned to a specific project or application support team. Instead, assignments are based on Citywide strategies and priorities in conjunction with a careful matching of the knowledge, skills and abilities of IT professionals to the requirements of the assignment. Staffing changes are made regularly and easily as demands and requirements change.

In order to provide Resource Center staff with management continuity, a single supervisor is responsible for all administrative duties within the Resource Center such as training, department communications, disciplinary actions, performance reviews, hiring, recruiting, skills inventories, and leave time approval and tracking.

Benefits to Phoenix in establishing the Resource Center have been:

- More flexibility in assigning resources where and when they are needed;
- Faster response to resolve problems;
- More technically adept and knowledgeable staff;
- More cost-effective approach through shared resources;
- Increased technical expertise available to departments with limited resources;
- More consistent with the concept of cross-training;
- Earlier opportunity to development skills in advance of requirements;
- Better backup for mission-critical applications
- More opportunities for career development and skills enhancement for Resource Center staff; and
- More variety in work assignments.

Another innovative area is the flexibility provided by today's information technology environment. The "traditional" model for technical support of both legacy and client/server information technology solutions uses separate centers of technical expertise to maintain each critical component of the business system. This model typically places the UNIX System Administrator (client/server) or the mainframe Operating System support in a Technical Services Division. Continuing

> **IT Services Provided by Resource Center Professionals**
>
> - **Data Management** - Data Conversion, Data Integration, and Data Modeling.
> - **Analysis and Planning** - Process Analysis, Transition Planning, Feasibility Studies, Strategic Planning, Risk Analysis, Requirements Analysis, Cost Analysis, Migration Planning, JAD (Joint Application Development) Sessions, RFQ / RFP Preparation, Business Systems Studies and Business Analysis.
> - **Project Management** - Project Planning and Coordination.
> - **Quality Assurance -** System Testing, Test Planning and Third-Party Quality Assurance.
> - **Research & Consulting** - Consulting / Advising, Technology Research, Emerging Technology Solutions, Trend Analysis and Best Practices Research.
> - **Software Development and Support** – Analysis, Prototyping, Problem Solving/ Trouble Shooting, and Application Programming and System Design.
> - **System Implementation & Integration** - Package Solution Implementation, Shared Solution Identification, Implementation Support, Standards Development, and Application Security Design.
> - **Training & Documentation -** End User Documentation, System Documentation, Technical Documentation and End User Training.

the traditional model, the Database Administrator is normally in a separate management chain, usually aligned with the systems analyst and maintenance programming services unit. Next, the traditional model puts the Application System Administration role in another division, usually associated with functional systems support roles. Next, the traditional model either staffs its own networking technicians, or farms this out to yet another IT division. Finally, the traditional model places security roles in another isolated division. Ultimately, this methodology has supported the majority of business solutions in the industry for many years. However it has many inefficiencies, the most notable of which is that each business application system requires more support personnel than is actually necessary.

When Phoenix began the SAP Project, traditional models were assessed, but the project was open to new ideas and concepts if their merit could be reasonably predicted. The SAP Technical Environment solution task was ultimately given to a single section of ITD. A SAP Technical Environment Support Team was created to be a single group that would fulfill the four traditional full-time support roles: Security, Host System Administration, Database Administration, and Application System Administration, and the added full or part-time role of desktop PC and data communications support.

The SAP Technical Support Team members were selected on the basis of proven expertise in at least two of the four essential disciplines. Then Team members were provided advanced training in the other areas in pairs. This created a fully cross-trained staff in the shortest possible time. Fortunately, several team members were experienced in network and desktop support areas. Ultimately, our SAP environment would have required at least eight, and potentially ten, direct technical support staff, each pair supporting a single disciplinary area.

Phoenix's innovative approach staffed the entire technical support effort with only five people. This was only possible because Phoenix had the vision to entertain new concepts and ideas, and the fortitude to abandon traditional models when new models could be designed and proven viable. Phoenix's SAP Technical Support Team readily handles all services and problem calls in the full range of technical support areas. This is far more efficient than the traditional model and eliminates lost time when problems are handed off between different units in differing management chains in the traditional model.

Combining all the technical support roles in a single unit reporting to a single manager resulted in faster project implementation, and is providing a far higher and more responsive direct support environment on a continuing basis.

Also, during the design and analysis phase of the CHRIS Project, many new information technology concepts were blended with existing concepts to ensure successful implementation:

Project Organization – four components
1. Steering Committee - Personnel Director, Finance Director, Information Technology Director and Assistant Budget and Research Director
2. Working Committee - Full-time representatives from Personnel, Finance and ITD
3. Consultants - Human resources system experts
4. Technical Staff - Database, Operations, Network, Systems Software and Applications

Identification of Project Requirements and Vendor Selection
Joint Application Development sessions with members of the Working Committee plus others as necessary, were conducted to identify Request For Proposal (RFP) required elements. The RFP was developed with the assistance of the Working Committee and consultants. The consultants did not participate in the development of the evaluation criteria that was used to make vendor selection. The Steering Committee approved the Working Committee's recommendation to select PeopleSoft.

Transition Management
The project employed a concept called Transition Management. A high-level, line manager from both Personnel and Finance were assigned full time to the project. They made business decisions that affected their areas and had the power to implement them. Many changes in the existing business systems occurred because the Transition Managers were actively involved with the project and understood the reasons for requested changes.

Cross-functional Teams
Functional representatives from all aspects of Personnel and Payroll were assigned full-time to the project. Their roles were to provide accurate information about the current business systems and to recommend changes based upon the opportunities offered by the new system.

Business Operations Plan
The Business Operations Plan (BOP) was developed with the assistance of PeopleSoft business partners who acted as product experts. They facilitated JAD sessions on each business process. The document consisted of the following components: Executive Summary, Scope (background, major business areas, approach, and documentation), Business Process Fit (overview of the BOP sessions, summary of fits and gaps, and process owners by business event), Gap Analysis (business process requirements, standard PeopleSoft solution, alternatives, and recommended solution), Results and Recommendations (re-engineering opportunities), Implementation Task List Summary, BOP Session Workflow Diagrams, Phase 1 Implementation Task List, and Outstanding Issues Log.

Focus groups
Focus groups, consisting of representatives from the major departments, volunteered to help redesign the forms and reports that were to be used throughout Phoenix. In addition, a different focus group developed the training requirements. Once the training requirements were identified, representatives from Personnel and Payroll were assigned full-time to develop the training curriculum and conduct the classes.

Testing Scripts
A team of functional users was assembled to develop realistic data and scripts that would be used to determine whether the system was operating properly for all business tasks. This team consisted of approximately 30 individuals who applied the scripts against the system and documented any problems. As problems were corrected, the scripts were re-run until the problem was resolved. These scripts included cycle testing that allowed the testers to follow the task through a complete cycle at least once. Based on script testing results, each functional area was required to sign off on the production readiness of the business tasks. Once all business tasks were successfully tested, a recommendation was made to the Steering Committee to implement the system.

With the implementation of both the SAP and CHRIS systems, Phoenix recognized a new requirement for information technical support staff.   Information technology systems require a dedicated support staff to provide ongoing maintenance and development activities. In addition to the partnership between ITD and Personnel for the new human resources information technology system, the two departments worked together over the past few years to develop new strategies for attracting and retaining highly skilled information technology professionals. Below are some of the accomplishments made over the past two years:

1.   In 1997, Phoenix issued a Request For Qualifications for Technical Recruitment Services and began uses professional recruitment firms for specific information technology areas: database administration, UNIX system administration, and SAP technical specialists. ITD was a pilot department for use of recruiters for information technology personnel and continues to utilize recruiters when necessary.

2.   Administrative Regulation 2.22, Specialty Skills Premium Pay, was issued in 1997 authorizing the City Manager to offer specialty skills premium pay not to exceed 10% of base salary to specific employees recruited or trained in specific advanced information technology fields. Such premium pay shall not be paid for a period longer than the designated project to which the employee is assigned on a dedicated basis. In consideration for payment of such pay premium, an agreement will be executed between Phoenix and employee providing for reimbursement to Phoenix of such training or recruitment costs. Reimbursement will be paid to Phoenix should the employee voluntarily leave Phoenix employment during the initial two-year period following commencement of employment or completion of training.

3.   On October 7, 1998, a Pay Ordinance was adopted to "Authorize the City Manager to fill information technology positions above the salary mid-point."   This Pay Ordinance negates the need for City departments to request City Council approval to hire information technology positions above the salary mid-point.

The recruitment process for all Information Technology classifications has been streamlined to be more comparable to the private-sector job application process and senior-level information technology positions are now under continuous recruitment. Particular emphasis has been placed on Phoenix's Internet site that highlights recruitment efforts for specific senior-level information technology specialist classifications. Job applications, as well as a wealth of information regarding recruitments, benefits, job descriptions, and pay ranges are available electronically on the web at www.ci.phoenix.az.us/JOBS/jobsidx.html.

Thank you for your valuable assistance in providing this information.

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